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VIEWS, NEWS AND INTERVIEWS.

"I used to work 18 hours a day," said a well-known electrical inventor. "After some years of this I decided to work 12 hours a day, and found I could accomplish considerably more. Then I made up my mind that I, like any other man, was entitled to a vacation every year, so I worked eight months and played four months of each year for a number of years. I found I was accomplishing still more work. Now I am beginning to believe that if I devote 11 months to mental inventing, either in the laboratory or in the Adirondacks, or anywhere, and one month to putting my invention in concrete form, I can do still more and better work. We are all too conceited, and when we get a machine built we are apt to decide that it's just about right and no one could improve upon it. Then we begin to pick it apart and find plenty of defects that have to be cured and details that have to be worked out. So I think it will be wiser to do all this mentally and on paper before actually constructing the invention. I'm going to try it, at any rate."

The Statistician and Economist, for 1895-96, gives the following telegraphic figures: Total telegraph lines of the world, 904,701 miles; total miles of wire, 2,682,583. Total miles of telegraph in the United States at the close of 1894, 190,303; total miles of wire in the United States, 790,792.

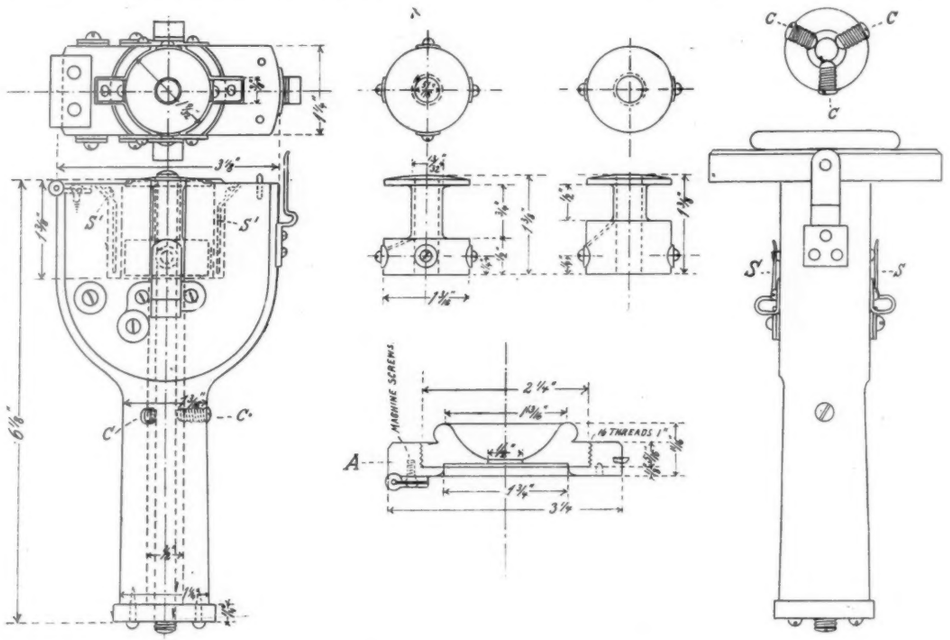


Fig. 2.—Working Drawings of Caldwell's Laboratory Telephone.

There will be power to give away if all the motors that are brought here by sanguine inventors to be immersed and experimented with in the waters of Niagara do anything like what is claimed for them, says a press dispatch from Niagara Falls. While Eugene Ruhlman of Lockport is getting a big screw wheel in position near the Devil's Hole, Marshall Thatcher, the United States Consul at Windsor, Ont., comes along with a wheel in hand, which he sets revolving in the whirlpool rapids. Hardly a week passes now that some chap with wheels can not be seen along the margin of the river either below or above the Falls.

Special attention is being given by the French military authorities, says a Paris correspondent, to the matter of succoring the wounded on battlefields when night comes on after a great battle. Experiments have been made with powerful electric arc lights, but the apparatus has conditions. At length it has been practically determined that the ambulance corps men shall wear little incandescent glow lamps in their hats, just like the ladies of the ballet in a spectacular extravaganza. Each man is to carry a little primary battery in his pocket for the production of the current.

The last report of the Postmaster-General of England shows that the annual deficit on the telegraph service goes from bad to worse. In seven years the loss now amounts to nearly $13,000,000, and this in spite of, or perhaps because of, a good increase in the business done.

A LABORATORY TELEPHONE.

BY E. W. CALDWELL.

The magneto telephone, on account of its portability and its extreme sensitiveness as a current detector, has come to be a very useful instrument in the laboratory. In many measurements employing the "zero method" the telephone may be substituted for the galvanometer, and it may be used in many places where the galvanometer, with its delicate fibre suspension, would be inconvenient.

In some tests—for example, the Kohlrausch method for resistance of electrolytes—the telephone has a place of its own, which cannot be filled as well by any other instrument.

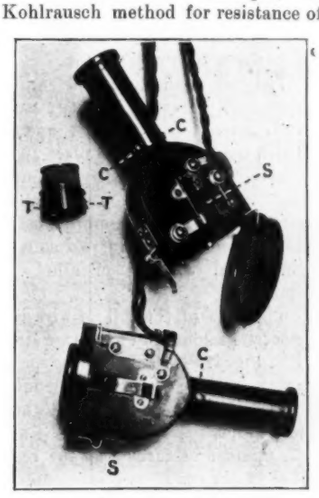


Fig. 1.—Caldwell's Laboratory Telephone.

For general laboratory use a number of telephones wound to different resistances are needed, so that for any given work a telephone having a suitable winding may be selected.

Occasionally it is desirable to change the winding of a telephone and to keep the same magnet and diaphragm and exactly the same adjustment of the distance between the diaphragm and magnet. To meet such a condition as this the writer has devised a special form of magneto telephone, which has been used for three or four years in telephone work of various kinds, including the experi-

ments of the United States Lighthouse Board for establishing telephonic communication with lightships.

As the instrument has proven useful and convenient, it was thought that a description of it would interest some of the readers of the ELECTRICAL REVIEW.

Fig. 1 shows the instrument in perspective, and working drawings of the same are shown in Fig. 2.

As will be seen from Figs. 1 and 2, the improvement consists simply in hinging the cap or ear-piece to the telephone case, and in winding coils of wire of different sizes upon spools of special form, which may be readily inserted in the telephone or withdrawn from it.

The working parts *i i*, the diaphragm magnet and coils, are of nearly the same dimensions as those in the ordinary telephone receiver, and the efficiency of operation is consequently about the same as that of the common receiving telephone.

The hinged cap is made in two pieces, between which the diaphragm is clamped in the usual manner, as is shown at A, Fig. 2. The receiver case is flattened at two sides to facilitate removing the coils and brightening the contact springs.

The back of the diaphragm being exposed, shows a reflected image of the end of the magnet, which proves a convenience when adjusting the distance between magnet and diaphragm.

The magnet is adjusted by means of a screw-thread cut in one end. Three set-screws, *c c c*, Figs. 1 and 2, serve to center it and clamp it rigidly in position after adjustment.

The ends of the telephone cord are connected permanently to two strong brass springs (*s s*, Figs. 1 and 2), which hold the spool in place in the receiver and make electrical connection with it. Two other contact springs, *s' s'*, Fig. 2, are provided for use with spools having two coils for differential winding or other purposes.

The ends of the coil of wire on a spool are soldered to two brass strips, T T, Fig. 1, which engage the springs *s s* when the spool is in the telephone.

The spools are stamped with numbers indicating the size of the wire, the number of turns and the resistance of the coil.

About thirty sizes of spools have been made, ranging in resistance from 0.01 ohm to 450 ohms. One of these spools has been wound to carry a current of 20 amperes.

A carrying case for thirty spools is provided for use with the instrument.

With a telephone provided with so many spools one of suitable winding for almost any purpose may be selected. As the spools may be quickly changed, the most suitable winding for any given work may be easily determined by experiment.

The Southern New England Telephone Company will install considerable underground work during the coming year in Hartford, Bridgeport and Waterbury, Conn.

TELEPHONE NEWS AND COMMENT.

The work of laying underground telephone cables at Portland, Me., has begun.

The Postal Telegraph-Cable Company is said to be considering the extension of its lines into Texas.

It is reported that the Franklyn Telephone Company is endeavoring to establish a local exchange at New Haven, Conn.

The American Telephone and Telegraph Company is rapidly pushing forward its construction work in the vicinity of Perth Amboy, N. J.

The Board of Street and Water Commissioners of Newark, N. J., recently passed the new telephone company franchise on its first reading.

The farmers along Roses Brook, Del., are preparing to build a telephone line from the head of the Brook to Almeda and thence to Bloomville.

The stockholders of the Delmarvia Telephone Company, which was chartered by the last legislature, met recently at Wilmington, Del., and organized.

The new Jacksonville, Fla., Telephone Company has received 200 poles. The work of setting them will begin soon, and the line construction, it is reported, will be rapidly pushed to completion.

Men who once might have had almost all the Bell telephone stock they wanted for the asking will smile grimly as they read that in a Boston auction room 5,849 shares were bought at $196 per share.—*Dover, Me., Observer.*

The Hudson River Telephone Company has been conducting a series of observations as to the relative number of calls made by certain of its subscribers. As a result, it has now introduced, in addition to its present or unlimited system, the measured service system, in use in Buffalo, New York, Philadelphia and elsewhere.

The business of the local telephone exchange at Brookline, Mass., has increased so as to require six day operators. During October the increase in number of subscribers was larger, it is said, than for any previous month. The present list contains 4:0 names and it is thought by January 1 next the number will have reached 500.

The Ohio Valley Telephone Company has recently opened several public pay stations equipped with the Gray automatic pay-station apparatus, and it contemplates placing the Hayes automatic nickel-in-the-slot device in drug stores and other prominent places in Louisville, Ky., where a large amount of dead-head telephoning is now being done.

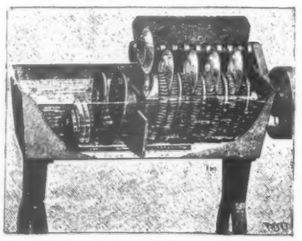
Referring to the fact that the contract between the Western Union Telegraph Company and the American Bell Telephone Company will expire in November, 1896, a Boston banker is quoted as saying: "There seems to be no good reason why the Bell Telephone Company should not then go immediately into the telegraph business on a large scale, and secure at least one-half of the total business done."

Here's some rich and juicy telephone news from the New York *Mail and Express:*

The use of long-distance telephoning is rapidly increasing, and there are now in use between New York, Boston and Philadelphia 40,000 long-distance wires, and in the whole system there are 55,000 miles of pole line and 265,000 miles of wire.

The writer of the above must have had 40,000 electric fans buzzing in his cranium while writing.

The Central District and Printing Telegraph Company has reduced the Bell rates at Steubenville, O., from $9 and $7 per quarter to $4.50 and $3.75 per quarter, respectively. Subscribers on five-party lines who formerly paid $12 per year will now pay $6 per year. The Phoenix company have organized a local exchange in Steubenville and have made a canvass for subscribers. They have not yet announced a rate to meet the cut made by the Bell exchange.



AN ELECTRICAL DISH-WASHER.

The United States Telephone Construction Company, of Philadelphia, have about concluded arrangements for an increase of their capital stock. They report that they have a fine exchange in operation at Paris, Ky., which started off with 100 subscribers. They expect to have 300 subscribers before they get through. This company is also installing the entire telephone system in the new Philadelphia Bourse, and they expect to make it a very handsome and efficient plant.

For several months a rate war between the Southern Bell Telephone and Telegraph Company and the Interstate Telephone Company has been carried on in various North Carolina towns. As soon as the latter company would get its service in operation, however, the Bell people would reduce their rates. In Durham the "war" has reached that stage where the Bell instruments are offered free of charge. The Interstate Exchange it is reported, secured the written pledges of a number of customers before putting in their apparatus for one year, and hopes to hold them to its rates for at least that time.

His face was wreathed in smiles as he came out of the telephone box, after closing a heavy contract at his own figures with a customer 600 miles away. "That's a good day's work," said he, "Had I gone to ——— city, my customer would probably have noticed my eagerness to secure the contract and naturally would have hammered down the price. But the distance that intervenes must have lent a firmer—and possibly a more enchanting—tone to my proposition, and thus I was not only enabled to close the deal without making an expensive trip, but to secure my own price."—*Electrical Engineering.*

The board of directors of the Topeka, Kas., Telephone and Electric Company recently completed arrangements for reorganization of the company. Mr. A. K. Rodgers will retain his position as president and director, while Mr. C. E. Tomlinson has been chosen to succeed S. J. Bear as manager. Fred H. Glick was elected secretary. Mr. Bear's vacancy in the board of directors was filled by the choice of Mr. F. G. Moore, a Holton banker. The line between Holton and Topeka has been completed to North Topeka, and by roundabout connections to the central office, though the direct line is not quite complete. Conversation with Holton, Kas., was free all of last week to Topeka subscribers. This privilege was granted to celebrate the opening of the new line.

An Electrical Dish-Washer.

Among the ingenious labor-saving devices now on exhibition at the third "Labor Exposition" in the Palace of Industry, at Paris, is an electrical dish-washer, of which the *Literary Digest* translates the following description from *La Nature:*

"First we meet a dish-washer run by a Thury electric motor of 0.396 kilowatt. This motor, running at 2,500 turns a minute, puts in motion an intermediate wheel, which, by means of a belt, rotates an axle furnished with a large screw-thread. A series of brushes are fixed on this screw, and between these travels the dish, guided by a second screw that is to be seen just above. The figure shows the interior arrangement of the apparatus. A is the guiding screw; B, the brushes. The plate, placed at first at the right, is rubbed successively by all the brushes, then arrives at C, and falls at D into the water, to end finally at E, whence it is removed. This machine, constructed by M. Decoudun, can wash and rinse about 2,000 plates an hour."

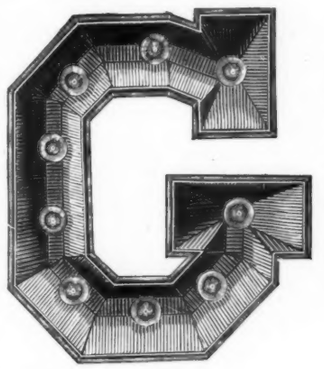
A New Arc Cut-Out Box.

Capt. T. H. Brady, of New Britain, Conn., who is widely known in electrical circles, has just brought out an entirely new cut-out which the ELECTRICAL REVIEW takes pleasure in illustrating herewith. It is built on an entirely new line, with adjustable jaws, making a perfect contact at all times. The cut-out has no dead center, has a perfect make and break and is thoroughly insulated. A number of these were first tried by different central stations and in every case gave perfect satisfaction. Mr. Brady, who is now manufacturing them on a large scale at his factory in New Britain, has every reason to be pleased with the outlook and will have a catalogue ready to send out in the next few days.

The many friends of Captain Brady will be glad to learn that he has again regained his health and will once more enter actively into electrical manufacture. His mast-arm is too well known in electric lighting circles to need mention here. The ELECTRICAL REVIEW extends congratulations to Captain Brady on his regained health and wishes him continued prosperity and activity.

Incandescent Reflecting Letters.

The demand for electric-lighted signs is daily increasing in all parts of the country. To meet this demand the E. P. Gleason Manufacturing Company, Mercer and Houston streets, New York city, have designed a series of concave letters for such use. The accompanying illustration shows a letter of the concave type. It is made of metal, lined with silvered glass and is 30 inches high. Only about half the number of lamps, it is claimed, are required for the proper illumination of these letters as compared with a sign composed entirely of incandescent lamps. Another style of letter is made in a similar form except that the concave face is enameled white and the back is removable so that the wiring may be got at without trouble.



INCANDESCENT REFLECTING LETTER FOR ELECTRIC-LIGHTED SIGNS.

IT IS HAIN'S ULTIMATUM.

THE AUTOCRAT OF THE "L" SAYS THERE WILL BE NO IMPROVEMENT IN THE LIGHTING OF THE CARS.

[*From the New York Herald, November 21.*]

The autocrat of the Manhattan Elevated Railway Company was yesterday approached by a *Herald* reporter with the following questions:

"Colonel Hain, it is said that the cars of the suburban elevated lines are better lighted than those of the city lines. Has a different method of illumination been adopted?"

"No," he replied. "All the cars of the company are lighted by the same system—the kerosene system," and the Colonel gave a subdued chuckle.

"Are similar lamps in use?"

"No, the lamps are a little different. And, then, they are newer. But I never heard that their light was better."

"Is any improvement contemplated in lighting the elevated cars?"

The Colonel assumed a look of surprise. "Why, *we* are very well satisfied with the illumination. *We* think it couldn't be better."

"But, Colonel, it is a common complaint that the cars are dimly lighted."

"Complaint?" repeated the Colonel, blandly. "Perhaps you haven't been on the Sixth avenue elevated road for a long while," he insinuated.

The reporter said that he lived in Harlem.

"Then, perhaps, you are near-sighted," suggested the Colonel. "Now, I ride on the Sixth avenue line nightly. I invariably read throughout the journey, and my eyes are better than they ever were."

"Don't you thing that the illumination would be improved were a gas-light system adopted?"

"No such light will ever be used by the company."

"Then is no improvement contemplated for the future."

"There will be no change in the illumination of the cars in the near or in the distant future," said the Colonel, positively. "*We* are satisfied with the light."

TO THE EDITOR OF THE *Herald*:

The article in this morning's edition on "Hain's Ultimatum" strikes a responsive chord in the hearts of thousands of citizens in this long-suffering metropolis. Were it not for the brutality and blackguardism so continually exhibited by the cable road employés the penny-wise and pound-foolish policy of the "L" road management would by this time be as evident to its stockholders as it is absurd to engineers and others familiar with modern scientific methods.

With a vivid remembrance of headaches and sore throats contracted in the miserably lighted and absolutely unventilated cars of Colonel Hain's palatial (?) trains, I venture to hope that the following statements will give additional impetus toward the reforms that must come sooner or later:

Every car on the road could be equipped at a cost not exceeding $25 each, with an automatic, reliable and unobtrusive ventilating device, costing nothing to operate, free from noise, draughts and cinders, and effecting a continual replacement of foul by pure air, Winter and Summer alike.

All cars and stations could be electrically lighted at a cost not exceeding that of the present "kerosene system," all legitimate items of expense taken into consideration, and with increased comfort and safety to passengers and employés.

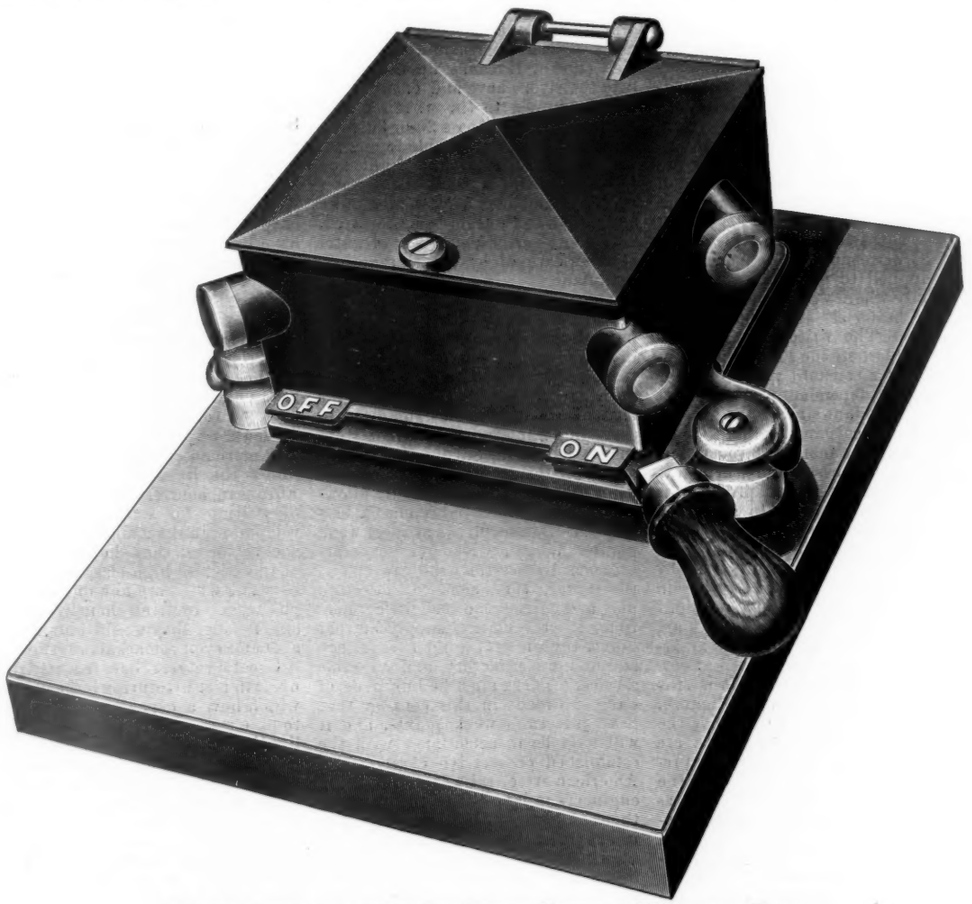
These are facts susceptible of proof, and it would be interesting to know on what grounds they have so long been ignored by Colonel Hain.

H. C. SPAULDING,
No. 1,227 Madison avenue,
NEW YORK, Nov. 21, 1895.

THE COLONEL'S COURTESY.

[*From the New York Press.*]

In Colonel Hain's tactful, courteous and public-spirited notification to "L" road patients—patrons is a word which we can hardly bring ourselves to use—that "there will be no change" in car darkening—we certainly can not say car lighting—and that no one should want anything "better than good, old-fashioned kerosene oil," there is little variation from standard humorous expressions of a similar state of feeling in the breasts of other masters of a situation, modern and ancient.



BRADY'S PATENT ARC CUT-OUT BOX, SHOWING METHOD OF FASTENING BY KNOBS.

Address Wanted.

An esteemed correspondent of the ELECTRICAL REVIEW writes to ask the name of the Elmira, N. Y., manufacturer who makes a new type of carriage and bicycle lamp, current for which is furnished by a primary battery. If any of our readers can supply this address we shall be pleased to forward it to our correspondent.

STORAGE BATTERY APPLICATIONS.

A Topical Discussion before the American Institute of Electrical Engineers, New York and Chicago, November 20, 1895.

THE STORAGE BATTERY FOR CENTRAL STATIONS, BY ARTHUR E. CHILDS.

The object of this paper is to bring before the Institute the main facts and considerations concerning the application of accumulators in electric generating stations both for light and power. The fact that storage batteries have reached a point of high efficiency and low cost of maintenance has stirred up engineers in this country to consider the application of storage batteries to their own plants, and thus the accumulator has assumed great importance at the present time, especially as power and light stations are so far developed that further increase in generating capacity means large additional expenditure and in a great many cases the rebuilding of the entire plant.

Realizing, therefore, that storage batteries are eminently practical as auxiliaries, and that their utility and value are acknowledged throughout Europe, it is not surprising that engineers and managers in this country are inquiring about them with the end in view of securing the full measure of their advantages and benefits. In England and on the Continent storage batteries have been used in central stations for more than five years, and the success of their application has brought about a great change of feeling regarding them; and the respect with which they are now regarded is an ample indication of the value they have been to managers in the operation of their stations.

It is an acknowledged fact that the great variations and fluctuations of the load on power circuits, especially those power circuits supplying trolley lines, are among the greatest difficulties which engineers have to contend against, and any appliances which will aid them to arrive at a satisfactory running of their station are looked upon with favor by them. It is only in the ranks of those short-sighted engineers, where ignorance and prejudice are the rule rather than the exception, that there are found men who will refuse to consider the storage battery as an auxiliary.

In this paper the term "variation" is used to designate the change of current induced by the adding of lights on to a lighting station, or of cars or motors on to a power station. The term "fluctuation" is used to indicate those rapid and necessary changes of current taking place on the outside line, due to stopping or starting of cars or throwing on or off of stationary motors. Although they may be thus differentiated, they bear a certain relation to each other, and in applying a storage battery a study of the conditions will quickly indicate the type of battery which will be more favorable in each case. By the "type" of battery is meant the slow-discharge battery for a long period of service, or the rapid-discharge battery for a few hours, or even less time of discharge.

In the lighting station, if we bear in mind the usual form of curve, it will be remembered that the instantaneous changes of current are minute and almost imperceptible compared with the steady increase or diminution of the total current of the station. Comparing the lighting curve with the usual form of power-station curve, it will be noticed that the instantaneous changes of current are enormous compared with that in the lighting-station curve. There is a similarity in the two curves in the fact that at certain hours of the day more cars are operated than at other hours, thus producing a general rise in the level of the power curve corresponding to throwing on a number of lights in the lighting curve.

It is not the purpose of this paper to discuss the characteristics of the two curves, but to consider in a general way the application of storage batteries to the wiping out of the fluctuations and variations as they come upon the dynamos and engines. The introduction of a storage battery into a central station, acts in a certain sense as a buffer between the external load and the dynamos, taking the shock of the variations without throwing the same on the engine. In this regard they have the effect of reducing the average percentage variation in load on the dynamo from a large amount to a very small one, making the operation of the machines more efficient. In fact, a storage battery acts as a regulator in this instance, maintaining, as it does, a constant voltage at the switchboard. This introduces the question of the efficiency of engines with varying loads; and leaving out of account the reports by engine builders, who are naturally interested parties, it is a fact that not many extended and careful investigations of efficiency under varying loads have been carried out. Prof. W. C. Unwin, of the Central Institution, at South Kensington, has shown, however, that a decrease of mechanical efficiency has a serious effect on the economy of working with a variable load, and with a load varying from 100 per cent to 25 per cent the efficiency decreases from 85 per cent to 40 per cent.

As applied to power stations, and especially where water power is used, storage batteries are almost indispensable. The writer knows of several plants where the successful maintenance of a constant voltage on the machines is dependent upon the fact that an attendant sits by the governors of the wheels and regulates them by hand, as the inertia of the water, even when the best water-wheel governor that has ever been produced is employed, is too great to allow the turbines to pick up or throw off the load with anything like the quickness with which it is thrown on or off by the outside circuit. The stations in mind are not small stations, as might be supposed at first thought, but are stations where several thousand horse-power and over are generated at certain hours of the day; and it is surprising that engineers of intelligence, who are usually quick to perceive the advantages of new applications, are still allowing their prejudices to prevent them from investigating the merits and value of accumulators as regulating governors in their stations.

In the application of storage batteries to the power station of a trolley system it is not unusual to find the variation in load as much as 50 per cent below the average horse-power, and even as great as 200 per cent above the mean load. These enormous fluctuations take place in the course of a few minutes, and are an expense to the railroad companies in at least three ways. In the first instance, they require the use of a dynamo capacity very much in excess of that required where the station is operated at a constant load. In the second instance, these fluctuations reduce the life of the machinery of the station, producing a very large depreciation account. In the third instance, the efficiency of the generating plant is very much reduced, as pointed out in a previous paragraph. It has been figured out in a number of instances that, could the steam be utilized in a proper manner in the engines driving the dynamos, at least 40 per cent more work could be obtained from it.

When considering the application of storage batteries to illuminating plants, it is found that their value is equally as great as in the case of power stations, as the charging of the battery can be done while the plant is operating at light loads, thus making use of the power of their machines to great advantage. At the period of heavy load, the battery is able to take care of the peak of the load, and also to operate the lights during that period of the 24 hours when few lights are being supplied from the station.

The value of an accumulator plant attached to an illuminating station has been thoroughly demonstrated by the New York Edison Illuminating Company, and the Edison Illuminating Company, of Boston, and recently in the plant of the Lawrence Gas Company, Lawrence, Mass. In the last case the battery is used in connection with their Edison three-wire system, and is used in the regular way of carrying the peak of the load during the busy hours of lighting. A secondary use of this particular battery is that at noon, when the large mills on the Merrimac at Lawrence shut down, it backs up the water into the river above and entirely cut off the supply to the wheels of the gas company (for some 25 or 30 minutes) which are thus unable to operate the machines furnishing light and power until the overflow of the water which is dammed back comes down and allows the station to be operated. This short period of absence of water is taken care of by the storage battery plant.

The storage battery can also be used as a valuable adjunct to both power and lighting stations at points in their systems where it is difficult to maintain the voltage at periods of heavy load. In these cases the feeders are usually not sufficient to carry the whole current direct from the station. But during the periods of small load the feeders can be utilized up to their maximum allowable drop in potential to charge battery sub-stations placed at these weak points. When the load at such points becomes greater than the capacity of the feeder, the battery comes into play and carries the load in connection with the station supply at that point, thus maintaining the voltage and doing satisfactory and valuable service. There must be hundreds of street railroads in this country that have just such weak points, and it will only be in accordance with the established progressive character of American street railway and lighting engineers to investigate the value to them of a storage battery, as soon as it has been brought thoroughly to their notice. This can not but result in a widely extended use of the storage batteries for this purpose; and the expectations of those interested in storage batteries would not be exceeded if half the street railroads and direct-current lighting plants in this country and Canada should adopt within the next few years storage batteries either at their central stations or at sub-stations, the more especially as they can now obtain storage batteries which are thoroughly reliable, and which can be installed under a guarantee.

The extent to which storage batteries have been used in England and on the Continent is very great; and it will surprise many engineers in this country to know that there are more than 20 lighting stations and several thousand isolated plants in Great Britain alone using storage batteries. Further than this, there are in Germany 5,000 isolated plants and 15 railway power plants using storage batteries. In fact, 80 per cent of all the central stations in Germany and Austria are equipped with storage batteries. In addition to the above there are many stations in France, Italy, Holland, Belgium, Sweden, Norway, Denmark and Spain and two or three in Switzerland.

A survey of the progress which storage batteries have made in European countries indicates no very great change in the principles of construction, but the results seem to be rather due to a thorough analysis and appreciation of the requirements of each case. This has resulted in a proper use of batteries and a correct recognition of the limitations of their usefulness. This fact alone has contributed largely to their successful application. The great difficulty in this country has been that engineers have not recognized a proper limit to the usefulness of a battery, but have, in many cases, far exceeded its specified limitations, and in this way have injured the batteries and cast discredit on them. It would be just as reasonable to overwork an engine until injured or worn out, and then declare that all engines were useless and expensive mechanical contrivances.

One point which has contributed largely towards the success of storage batteries in Europe is the fact that engineers have endeavored to obtain long life and high efficiency even at the expense of increased first cost, and instead of attempting to obtain a large output per pound of element, they have limited themselves to a reasonable number of ampere hours per pound. The result of this has been that the batteries in use in Europe have shown great endurance and solidity. The experience, however, which has been obtained with many American batteries has not been so promising as on the Continent, owing to the lack of proper appreciation of them. It would be greatly to the advantage of American engineers if they would follow the lines laid down by their European confreres; and if, instead of waiting for some marvelous development in the manufacture of storage batteries, they should make use of the existing high-class and efficient batteries which are now offered to the public, and by using them in a reasonable manner they would obtain valuable and even remarkable results.

Great progress has recently been made in manufacturing large batteries which have a capacity large enough to take care of the needs of central lighting and power stations, and engineers need no longer complain that they are unable to get the large cells which they require. In fact, manufacturers can produce cells having almost any given capacity.

Considering the efficiency of a storage battery, the factors which tend to reduce it are due to a loss in voltage and in the quantity of current. These losses, however, are not so serious as they have been in the past, and manufacturers are at present able to guarantee a very high efficiency. In cells which were submitted to Prof. H. L. Callender, an ampere efficiency of 96.1 per cent was recorded, the watt efficiency being 84 per cent. In certain instances, however, known to the writer, these efficiencies have been slightly exceeded, and complaints from central

station managers, that they cannot obtain efficient cells, are now groundless, as with the efficiencies named, an eminently satisfactory service can be obtained. It must be borne in mind that a loss of 16 per cent, or even 20 per cent, in the efficiency of the battery does not mean the loss of the same percentage in the output of the station, as the battery usually supplies, approximately, or even less, of the whole output in watt-hours, and it is, therefore, from that fraction of the whole output that the loss in the battery must be deducted.

In the matter of cost of maintenance of a storage battery outfit, it is now usual for the manufacturer to guarantee a fixed annual percentage. This percentage varies from 10 per cent in small plants to a smaller percentage in large plants, depending, of course, on the conditions of operation and the use to be made of the battery, a study of which will soon determine what percentage can be guaranteed. In first-class plants, well installed and operated by careful engineers, the cost of maintenance can be reduced to the vicinity of 3.5 or four per cent. It is customary for the manufacturers to enter into a contract in the case of large plants, guaranteeing that the cost of maintenance shall not exceed a certain percentage per annum for the period of contract. This can be carried out in two ways—either the lighting or railroad company can pay the manufacturer the percentage specified every year, and the manufacturer will inspect and keep the battery in first-class condition, or the company employing the batteries can inspect and order renewals themselves, in which case, should the cost of maintenance exceed the percentage guaranteed, the manufacturer will not charge more than the specified amount. This is an exception rather than the rule, however, as the cost of maintenance is usually somewhat lower than that specified by the manufacturers, so that the company owning the battery is the gainer by the difference in percentage. By a thorough attention to details, both large and small, the percentage can be kept down to a very low figure; and it is to be regretted that the practice of engineers which prevails in Europe, of treating the battery with care and consideration, does not seem to exist among the engineers of this country, to the detriment of their own lighting or railroad plants, which would otherwise be able to utilize batteries in an efficient manner.

(To be continued.)

A CHIMNEY TWO HUNDRED AND THIRTY FEET HIGH.

INTERESTING ENGINEERING FEAT IN WHICH AN ELECTRIC HOIST RENDERED VALUABLE AID.

The Edison Electric Illuminating Company, of Paterson, N. J., has recently completed, in connection with its new plant in that city, a chimney 230 feet high. The building of this monster smokestack presented several interesting engineering features, two of which are the short time in which it was completed and the use of an electric hoist in its construction. Exactly six weeks of actual working days were spent in building this chimney, which is an unusually short time when its size is considered. Nearly 1,000,000 bricks were used in the structure, which has a diameter 21 feet at the base and 13 feet near the top, where it spreads out to a diameter 16 feet 6 inches. The chimney has an outside wall, six feet thick at the base, tapering to one foot near the top, and measuring three feet two inches at the top. For a distance of 130 feet there is an inside wall, strengthened by iron bands. Between the two walls is an eight-inch air space. This space is covered at the top of the inside wall to prevent soot or loose bricks from falling down. A free circulation of air is secured at the bottom of the chimney by four large holes facing each point of the compass. The cap is of iron and weighs 6,000 pounds. An iron ladder runs up the outside of the chimney from the base to the extreme top. On three sides of the chimney, near the top, are three letters "E," each of which is seven feet high, made of iron and weighing 400 pounds. From the ground they appear to be about one foot high. The iron and brick in the structure cost $100,000.

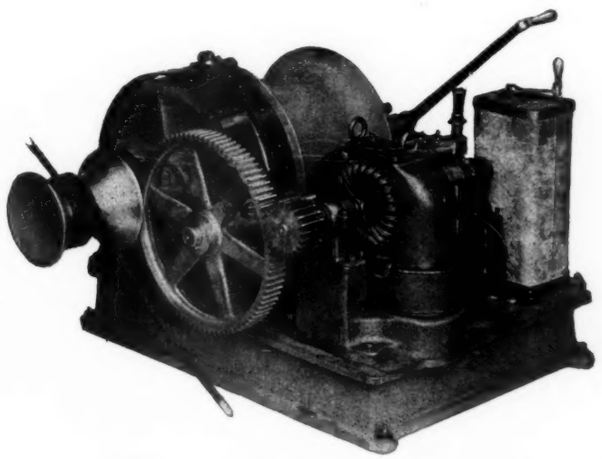


FIG. 1.—CROCKER-WHEELER ELECTRIC COMPANY'S SPECIAL ELECTRIC HOIST USED IN THE CONSTRUCTION OF THE PATERSON CHIMNEY.

In the construction of the chimney, an electric hoist was used instead of a steam hoist, a great economy in the space occupied being made by the innovation. Mr. J. W. Ferguson, the engineer who constructed the chimney, is to be credited with this modern idea.

The hoist, which is shown in Fig. 1, was equipped by the Crocker-Wheeler Electric Company, of New York city, with one of their special size seven and one-half low-speed "crane" type motors and "mill" type reversing controllers attached to one of W. A. Crook & Brothers Company's hoists. The hoist operated two platforms, each about three feet long and two feet wide, which carried 120 bricks and two pails of mortar to the top of the chimney. The platforms worked simultaneously, one going up while the other came down. A system of automatic electric signals was employed to notify the man in charge of the hoist when to stop and start. The hoist was originally geared for a rope speed of 250 feet per minute. This rope speed was changed to about 500 feet per minute soon after the hoist was installed, by changing the ratio of the gears, thus doubling the load on the motor. The actual net load on the hoist during each trip was between 600 and 700 pounds. The control of the hoist as to stopping, starting, and the ready control of speed in either direction, is reported to have been more perfect than with a steam hoist.

Mr. Ferguson, who is a well known engineer and builder, in a letter in regard to this machine, writes as follows: "I have not had one moment's delay since the machine was started, and it has done its work thoroughly and without a hitch. I am so pleased with the working of this motor, that I hope soon to make use of them for other purposes in connection with my work." The Crocker-Wheeler Electric Company is to be congratulated on the successful carrying out of this installation.

In Fig. 2 is shown another very interesting type of hoist made by the Crocker-Wheeler company. It is known as their electric "skull cracker" hoist and is designed for use in rolling mills where it is necessary to break up large masses of cast-iron. In this work the "skull cracker" hoist plays a similiar part to the donkey engine on a pile driver. It raises an iron ball weighing 4,000 pounds, which is dropped from the desired height upon the cast-iron to break it up. The speed of this hoist when working with a 4,000 pound ball is 100 feet per minute. With the back gear thrown in, the hoist has a lifting capacity of 13,000 pounds, at 30 feet per minute.

The two examples of the Crocker-Wheeler Electric Company's work, shown herewith, are selected from many which they have recently turned out. They have met with gratifying success in adapting their motors and dynamos to installations which require unusual and original designs.

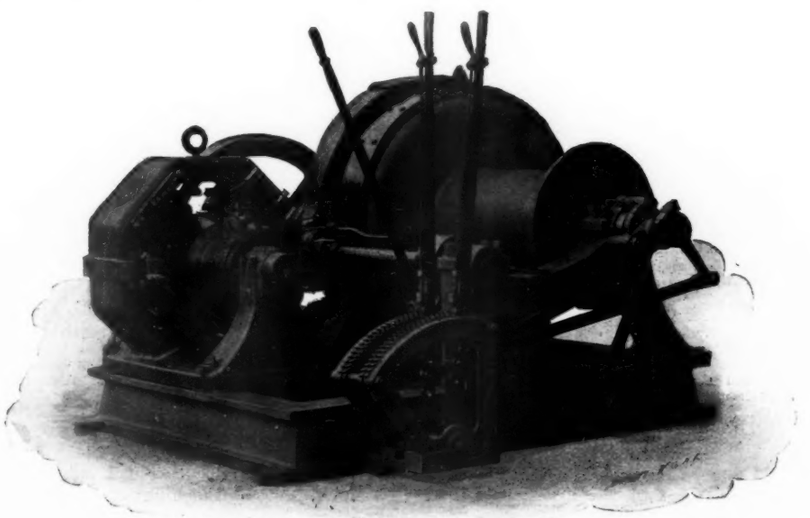


FIG. 2.—CROCKER-WHEELER ELECTRIC COMPANY'S ELECTRIC "SKULL-CRACKER" HOIST.

National Electrical Exposition Company.

The National Electrical Exposition Company, of New York city—capital, $10,000—was incorporated at Albany on November 22. The directors named are Harrison J. Smith, Marcus Nathan, Robert B. Corey, Stephen A. Douglas, William F. Weise, William A. Stadelman, C. O. Baker, Jr., John A. Seely and George F. Porter, all of New York city. This is the company which will handle the exhibition of electrical apparatus which will be held in connection with the next convention of the National Electric Light Association, which will meet in New York city next May. The exhibition will probably be held in the Grand Central Palace.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*

***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, NOV. 27, 1895.

CONTENTS.

	PAGE
Views, News and Interviews	301
A Laboratory Telephone	301
Telephone News and Comment	302
An Electrical Dish-Washer	302
A New Arc Cut-Out Box	303
Address Wanted	303
Incandescent Reflecting Letters	303
It Is Hain's Ultimatum	303
Storage Battery Applications	304
A Chimney Two Hundred and Thirty Feet High	305
National Electrical Exposition Company	305
An Important Telegraph Decision	306
Wall Street and the Electrical Stock Market	306
Items of Interest	307
Literary	307
Electric Railway Progress in Oshkosh	307
The Pacific Cable	307
President Coffin's Resignation	307
Edison on the Horseless Carriage	307
Electrical Apparatus Wanted in Florida	307
A Heavy Damage Verdict Affirmed	307
The Standard Telephone Company	308
Samples of Silicon Bronze Wire Wanted	308
Street Railways in the United States	308
Our Canadian Letter	309
Clumsily Worded English Advertisements	309
Press Club Dinner to Sir Henry Irving	309
Injunction Against Boston Socket Manufacturers	309
"Lodian" Traveling Technical Correspondent	309
American Institute of Electrical Engineers	309
Some Good Advice	309
Municipal Telephony	310
Electric Railway Notes	311
Personal	311
The Madison Avenue Storage Battery Cars	311
Advance Information	312
The Straus High-Voltage Lamp	313
Electrical Patents	314
Inspection of Electrical Plants	xi
The Rural Visitor Simply "Wanted to Know."	xi
The National Association of Manufacturers	xi
Kindred Interests	xii
A Conductor Corrected	xii

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
Abendroth & Root Mfg. Co., boilers	xviii
American Electrical Works, insulated wire	i
Armington & Sims, engines	xviii
Bristol Co., voltmeters	i
Bunnell & Co., J. H., dry batteries	i
Columbia Incandescent Lamp Co	i
Day's Kerite, insulated wire	i, x
Electric Appliance Co	i
Goubert Manufacturing Co., heaters	xviii
Greeley, E. S., & Co., electrical supplies	xviii
Hampson, E. P., & Co., engines	xviii
Interior Conduit and Insulation Co., Lundell dynamos and motors	i
Law Battery Co., open circuit batteries	i
Lombard Water-Wheel Governor Co	xviii
McKinney & Waterbury, electric light fixtures	i
New York & Ohio Co., Packard lamps	i
Okonite Co., insulated wire	i, xviii
Partridge Carbon Company, motor and generator brushes	i
Rhode Island Tool Co	xviii
Safety Insulated Wire and Cable Co	i
Stirling Co., water tube boilers	xviii
U. S. Telephone Construction Co., "M. & B." telephones	i
Westinghouse Electric & Mfg. Co., Sawyer-Man incandescent lamps	ii
Weston Engine Co., engines	i

INSIDE PAGES.

Adams-Bagnall Electric Co., arc and incandescent lamps	vii
Allen, L. B., soldering sticks	xii
American Bell Telephone Co	xiv
American Electric Telephone Co., long-distant telephones	xv
Bain, Forée, engineer	xiii
Baker & Co., platinum	vi
Baxter, H. E., & Co., electrical supplies	x
Beacon Lamp Co., incandescent lamps	xii
Belden Machine Co., drop forging	vii
Benjamin, Geo. H., patents	xiii
Bogart, A. L., patent rights for sale	313
Brady, T. H., Brady mast arms	314
Brill, J. G., Co., railway cars	x
Brixey, W. R., Day's kerite wires and cables	x
Bryant Electric Co., K. W. S	314
Buckeye Electric Co., incandescent lamps	viii
Central Electric Co., interior conduit	iii
Chapman Valve Mfg. Co	xvi
Consolidated Telegraph and News Co	xii
Correspondence School of Technology	314
Crown Woven Wire Brush Co	314
De Veau & Co., telephones	xv
Dixon, Jos., Crucible Co., belt dressing	xiii
Duval, W. S., Jr., patents	314
Dyer & Driscoll, patent solicitors	314
Eddy Electric Mfg. Co., Eddy generators	xiii
Electric Storage Battery Co	ix
Empire China Works, porcelain specialties	xvi
Eppenger & Russell Co., Valentine subway electrical conduit	xv
Euler, H. C., mother-of-pearl	xi
Faraday Carbon Co., carbons	xvi
Fleming, W. H., woven wire dynamo brushes	vii
Fort Wayne Electric Corporation, "Wood" apparatus	v
Garvin Machine Co	vi
Gates Electric Mfg. Co	iii
General Electric Co., electric light supplies	iv
Globe Electric Light Co., incandescent lamps	vi
Harrisburg Foundry & Machine Co., Harrisburg ideal engines	vi
Helios Electric Co., arc lamps	vii
Heneken Electric Heating Co., electric car heaters	314
Homer, F. E., & Co., commutators	xvi
Hooven, Owens & Rentschler Co., electric railway and electric light engines	iii
Independent Electric Co., fuse wire	314
International Correspondence Schools	314
Keystone Telephone Co	xv
Lenigh Valley Creosoting Co., creosoted lumber	xii
Manhattan Electrical Supply Co., Mesco battery	313
Marshall, Wm., condensers	xii
McIntire, The C., Co., connectors and terminals	xii
Mertopolitan Electric Co	ix
Metropolitan Telephone and Telegraph Co.	xii
Moore, Alfred F., insulated electric wire	vi
Morris, Tasker & Co., tubes, poles, etc	xi
Mosse, Rudolf	314
N. B. Gas and Edison Light Co., second-hand boilers and engines for sale	313
National Telephone Mfg. Co., telephones	xiv
New England Engineering Co	xiii
New Haven Car Register Co	iv
New York Belting and Packing Co., rubber belts	xvi
New York Insulated Wire Co	vi
Ostrander & Co., W. R., supplies	xii
Partrick & Carter Co., electrical supplies for housework	314
Phillips Insulated Wire Co., wire	313
Replogle Governor Works	vii
Riesinger, Hugo, carbons	x
Rodrigues, M. R., premier baby	xvi
Royce & Marean, electrical supplies	xii
Safety Car Heating and Lighting Co.	iii
Schoonmaker, A. O., India mica	xi
Scott Electric Lamp Co	xi
Situation wanted	xi
S. K. C. Specialty Co	xvi
Solar Carbon and Mfg. Co., carbon specialties	xvi
Southgate, W. B., & Co., ammeters and voltmeters	iii
Standard Thermometer Co., arc lamps	vi
Stanley Electric Manufacturing Co	viii
Stucky & Heck Electric Manufacturing Co.	xvi
Syracuse Storage Battery Co	vi
Walker Manufacturing Co	viii
Warren, A. K., & Co	xii
Washington Carbon Co., "Helios."	vii
Waterman, Chas. H., arc lamps	xi
Western Electric Co., supplies	xiii
Western Telephone Construction Co., telephones	xiv
Weston Electrical Instrument Co., measuring instruments	x
White-Crosby Co., contracting engineers	xii
Whitney Electrical Instrument Co	xii
Williams Mfg. Co., tanks	ix
Wyckoff, Seamans & Benedict, "Remington"	iii

AN IMPORTANT TELEGRAPH DECISION.

Last week the United States Supreme Court handed down a final decision in the long-pending suit of the United States against the Union Pacific Railway Company and the Western Union Telegraph Company. The court of last resort holds, in reference to the object and scope of the Pacific Railroad acts, that the first 18 sections of the acts of 1862-64 are wholly inconsistent "with the idea that the Union Pacific Railway Company could have fulfilled its obligations to the government by simply constructing a railroad, without making any provision whatever for the construction or operation of a telegraph line, thereby leaving all communication by telegraph along its route to the absolute control of private corporations deriving no authority from the national government and whose operations would not ordinarily be subjected to national supervision." The opinion further holds that since the passage of the act of 1866 no telegraph company can, by contract with a railroad company operating one of the post roads of the United States over which inter-State commerce is conducted, acquire an exclusive right to such railroads for telegraph purposes.

This decision may prove to be of importance to local and long-distance telephone companies. Heretofore, such companies have been obliged to build long-distance lines along highways or on private property along railroad routes. Further reference to the decision is made by our Wall street correspondent in another column.

The use of decorative designs formed of miniature incandescent lamps promises to be unusually large during the approaching holidays. A number of the large stores in New York and Chicago have already erected these modern advertising devices. Their effectiveness in attracting attention is not excelled by any device that we have seen.

There seems to be an increase of vitality on the part of several parent telephone companies in the West. These are the companies that are installing exchanges and selling apparatus—not stock and fictitious rights.

We are unable to discover any tangible strength of the Standard Telephone Company other than the names of the directors. Some of these have resigned. We predict that many more will follow.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The stock market is dragging on bed rock. Gold exports, European disturbances, reactions in the price of commodities and the like appear to have been fully discounted and the liquidation forced thereby to be over. The shipments of gold this week aggregated $7,350,000. It was about the heaviest week's movement this year. The fact that prices have been very firm and closed the week with only small net loss in the face of these exports indicates that they have been discounted, and moreover a belief that they will furnish an object lesson to Congress that will result in needed currency legislation. The prop of the market is excellent railroad earnings returned by all western and northwestern systems. These are a true index to business. They are a sustaining factor among people who own securities. The gold movement is expected to continue for some weeks, and the reserve may be worked down to a point where another issue of bonds may be regarded as necessary. Nearly all staples record reactions. This is largely due to selling by those who bought on speculation.

The all-absorbing event in the electrical-financial field this week was the decision of the United States Supreme Court approving the findings of the lower court in the Western Union Telegraph-Union Pacific Railway case. This decision annuls all contracts existing between the two and compels the Union Pacific to operate its own telegraph lines. It is very far-reaching in its scope and means that the Western Union company will no longer have a monopoly in using the lines of various railroad systems. In 1883, when there was talk of a government telegraph service, Western Union, through one of its brokers, issued a 61-page pamphlet calculated as a bull card. It becomes valuable to-day on account of this decision, because of the data given on railroad contracts. It seems that at that time the company had contracts with 600 railways, whereby the latter maintained the poles and operated and maintained the lines and shared the commercial receipts. The telegraph company furnished the wire, insulators and instruments. There was a further provision that no telegraph company other than Western Union should have the same advantage. This forced competitors to use the highways and to meet their own costs of operation, construction and maintenance. The advantage of this contract to Western Union can be seen when it is known that in 1883, 9,870 of its 12,386 offices were railroad offices. This was 78 per cent of the total. Allowing 70 per cent of the present offices there are 14,950 operated by the railways, and at a saving in expense of nearly $3,000,000 per year. There is little doubt that these contracts figure largely in the capitalization of the company, which,

as is well known, is $100,000,000. The decision will naturally impair the assets. The course of the stock in the week was downward, as might have been expected. The net loss, however, was only some three per cent. The comparative firmness of the stock was due to excellent support rendered. There is a feeling in speculative circles that after the next rally the stock will gradually sag lower. It is held all over the country, and it will take some time for investors to realize the import of this decision.

The Western Union decision as outlined will not only throw open railroad routes to telegraphic competition, but to telephone lines as well. Long-distance circuits that have heretofore been constructed with difficulty and great expense, and at times have been almost unable to secure a franchise through various territories, will receive a great impetus. It ought to tell eventually in the values of securities issued on telephone properties.

General Electric during the week under review led a very quiet existence. The price was fairly stable. It lost about one point in sympathy with the general market movement. The feeling in Wall street is that there is no immediate probability of a resignation of President Coffin of General Electric, although some signs seem to point to an ultimate termination of his relations. His resignation this week from the United Electric Securities Company, a corporation formed to dispose of General Electric security assets, has not been explained further than with a statement that it was a move in the interest of harmony. The bonds of the company sold at 92.

Edison Electric Illuminating of New York advanced over a point from low, recording 97¾ the close of the week. There was an unusually good demand for its bonds, the old 5's selling at 108½ to 109, and the consolidated 5's at 103 to 103¼. American Telegraph and Cable was traded in at 94.

On the Boston Exchange electrical securities were rather quiet. Bell Telephone ranged quietly around 199. Erie Telephone ended the week unchanged at 61½. New England Telephone was steady at 84½ @ 85. Westinghouse securities were nominal at 34½ @ 34¾ for the common and 54½ @ 54¾ for the preferred. In Philadelphia there was another exciting week in Electric Storage stocks. The high point was reached on Monday, it being 44¾ @ 45 for the common and 46 for the preferred. On Wednesday the common touched 35½ and the preferred 36. There was only a feeble rally in subsequent days. There appears to be more inherent weakness in these stocks than was first believed. The prolonged weakness can hardly be attributed to forced liquidation. It would seem that insiders, who have been freely predicting 100 and 200 for this stock, are unduly reticent.

BAIN.

New York, November 23, 1895.

ITEMS OF INTEREST.

Warden Sage, of Sing Sing Prison, has decided to abolish the use of kerosene lamps in the cells occupied by the convicts and substitute electric lights. They have been placed in the cells of the 1,350 convicts in the prison.

The Columbia Incandescent Lamp Company, of St. Louis, continues to secure its full share of orders for high-grade incandescent lamps for all services. The Columbia lamps for use in electric railway cars are meeting with special favor among street railway managers.

The Electric Club, of Cleveland, Ohio, will hold its regular meeting at the club rooms, 356 Superior street, Wednesday evening, December 4, at 8 o'clock. Prof. C. H. Benjamin, of Case School of Applied Science, will address the members, his subject being "Flywheels and Why They Burst."

The New York Gas Improvement Company, of New York city, to purchase and develop real and personal property, including machinery, inventions and patent rights relating to the manufacture and production of gas or electricity, and to construct and equip buildings and machinery and to lay pipes or wires, was incorporated on November 23. Capital, $23,000. Directors, Charles D. Lithgow, Emil Carlebach, John A. Snyder, Edward J. Kavanagh, Edward D. Phillips and P. F. Vaughan, of New York city.

At a meeting of the newly-elected board of directors of the Brooklyn, Queens County and Suburban Railroad Company, held in Brooklyn, N. Y., on November 23, the resignations of Messrs. C. N. Hoagland, S. L. Keeney, C. T. Young and T. F. Jackson were accepted. The following were elected to fill the vacancies: C. L. Rossiter, Anthony N. Brady, Bernard Gallagher and John G. Jenkins. The board then elected C. L. Rossiter, president of the company; J. G. Jenkins, vice-president, and A. M. Brady, chairman of the board. The executive committee will consist of A. M. Brady, chairman, and C. L. Rossiter, Henry Seibert, J. G. Jenkins and T. S. Williams. This will practically place the management in the hands of the Brooklyn Heights Company, as Mr. Rossiter is president of both concerns.

The Gates Electric Manufacturing Company, of Chicago, report the sale of a complete electric light plant for the United States Insane Asylum, at Phœnix, Ariz. This plant will comprise one 25-kilowatt multipolar generator, with handsome slate switchboard, one engine and a complete storage battery plant of the Electric Storage Battery Company. They have also sold for the United States Prison at Yuma, Ariz., a complete electric light outfit, precisely the same as at Phœnix. They have also installed a 75 horse-power multipolar, 25-volt meter in the works of Fraser & Chalmers, Chicago. They are installing a 60-kilowatt multipolar dynamo in the Stamford Hotel, Chicago. They report under contract four 100-kilowatt railway generators, one 80-kilowatt railway generator. The Gates firm is meeting with marked success.

LITERARY.

"Annual Report of the Chief of the Bureau of Steam Engineering, 1895" has been received from the Department of the Navy.

"Report of the Thirteenth Annual Meeting of the Street Railway Association of the State of New York," held at Albany, September 17, 1895, has been received.

We have received from the Department of State at Washington Vol. XII of the Special Consular Reports on "Highways of Commerce: The Ocean Lines, Railways, Canals and Other Trade Routes of Foreign Countries."

Cassier's Magazine has in its December number, among others, the following articles: "Electric Power in Collieries," by Llewelyn B. Atkinson, A. M. I. C. E.; "Power Consumption on Electric Railways," by A. K. Baylor. Current Topics: "Horseless Carriages," "An Electric Mountain Railroad on the Isle of Man," "Electric Heating for Buildings on a Large Scale," "An Electric Boat Elevator."

Electric Railway Progress in Oshkosh.

Through Percy Thompson & Company, investment bankers, of New York, the Central Wisconsin Electric Railway Company has finally completed the financial arrangements necessary for the immediate building of this road. The company will build at once 26 miles of road in the city of Oshkosh, Wis., and 16 miles of interurban line, all equipped with electricity. One million dollars of the company's bonds and a loan of $450,000 have been secured by Percy Thompson & Company and Charles E. W. Smith. Work has already been begun and will be rapidly pushed to completion.

The Pacific Cable.

All of the colonial agents in London, except the representatives of West and South Australia, had a conference with Mr. Joseph Chamberlain, Secretary of State for the Colonies, at the Colonial Office on November 19, with the result that Mr. Chamberlain agreed to appoint a commission to arrange the details of the construction of the proposed Pacific cable. The Imperial government, Australia and Canada will each appoint two delegates upon the commission, which will proceed with its work as soon as possible.

President Coffin's Resignation.

[*From the Boston Herald.*]

The alleged resignation of Presi- Coffin, of the General Electric Company, was referred to in his presence the other day and he simply smiled good-naturedly and kept "sawing wood."

Edison on the Horseless Carriage.

In a recent interview Thomas A. Edison spoke of the prospects of the horseless vehicle as follows:

"Talking of horseless vehicles, by the way," said Mr. Edison, "suggests to my mind that the horse is doomed, yet this animal shows a greater economy of force than man, for 70 per cent of the energy of the horse is available for work. But the horseless vehicle is the coming wonder.

"The bicycle, which ten years ago was a curiosity, is now a necessity. It is found everywhere.

"Ten years from now you will be able to buy a horseless vehicle for what you would have to pay to-day for a wagon and a pair of horses. The money spent in the keeping of the horses will be saved, and the danger to life will be much reduced.

"Will these vehicles be run by electricity?"

"I don't think so," said Mr. Edison. "As it looks at present, it would seem more likely that they will be run by a gasolene or naphtha motor of some kind. It is quite possible, however, that an electrical storage battery will be discovered which will prove more economical, but at present the gasolene or naphtha motor looks more promising.

"It is only a question of a short time when the carriages and trucks of every large city will be run with motors. The expense of keeping and feeding horses in a great city like New York is very great, and all this will be done away with, just as the cable and trolley cars have dispensed with horses.

"You must remember that every invention of this kind which is made adds to the general wealth by introducing a system of greater economy of force. A great invention which facilitates commerce enriches a country just as much as the discovery of vast hoards of gold.

"Even the deposits of gold have not been one-half exhausted. You take the present craze for mining speculation that is going on in England. That is undoubtedly based upon genuine merit in the South African mines."

Electrical Apparatus Wanted in Florida.

TO THE EDITOR OF ELECTRICAL REVIEW:

The city of Lake City, Fla., has just entered into a contract with the Lake City Water and Light Company to light the city for the term of 10 years, and the Lake City Water and Light Company wants best offers on a 45 or 50-arc-light dynamo, wire, lamps, both arc and incandescent, and all attachments.

Respectfully yours,

LAKE CITY WATER AND LIGHT CO.

Lake City, Fla., November 20, 1895.

A Heavy Damage Verdict Affirmed.

The New Jersey Court of Errors and Appeals affirmed a verdict in a heavy damage suit on November 18. It was in the case of Edward McMullen, of Newark, N. J., agent of the Western Union Telegraph Company. McMullen was a lineman. He lost an eye and was terribly burned by electricity while working for the company. He got a verdict of $25,000, and the defendants applied directly to the Court of Errors and Appeals, which confirmed the verdict.

THE STANDARD TELEPHONE COMPANY.

More "Fresh Reading Matter" From President Barnes.

HE MAKES ASSERTIONS WHICH THE FACTS DISPROVE, SHOWS THAT HE IS AN ECCENTRIC CONTROVERSIALIST AND IS "WILLING TO BE REGARDED AS A COUNTRYMAN"—WHO IS ONE "MAXWELL," CALLED BY PRESIDENT BARNES A "CLOUT?"

STANDARD TELEPHONE COMPANY,
NEW YORK.

TO THE EDITOR OF ELECTRICAL REVIEW:

"No one in private life, no one not himself in control of a great newspaper, should seek or care to reply to the attacks of a daily journal, for the conditions of such a contest would be manifestly unequal."

You will find the above very prudent and excellent proposition enunciated over my signature on the editorial page of the New York *Sun* bearing date the 23d of February, 1895.

I have lived up to it, in connection with telephonic controversies, fairly well; but when your letter of the 14th inst., following an ocean of silly charges, in the public press, came to hand, I was temporarily thrown off my guard by the apparent friendliness of your communication and relapsed into answering the questions that you asked, with what result? Simply that you now ask a long list of others, to which common courtesy appears to call for a final rejoinder. Several of your new inquiries, however, were disposed of in my first communication.

Taking up now the fresh points that you raise, I desire to say, in the first place, for the information of your wide circle of readers, to whom this correspondence is really directed, that all the slanders openly made or made by innuendo against the Standard Telephone Company were instigated in print over his signature, in circular form, by one "Maxwell," in Richmond, Virginia, and that the clout has "skipped" that city. His "mysterious disappearance" is no doubt due to fear that he would be arrested. So far as we are concerned, wherever he is, he can spend the subsidy he got from the Bell, even if it was so much as $15, in peace and happiness. His methods helped us in securing a local franchise. As to the character of its agents, the Bell was never very particular, but they really ought to hire tools with more courage and some intelligence

Turning to the feast of interrogatories to which you invite, not to say command, us, I observe that you sententiously remark, by way of an amicable introduction, that, in your opinion, "the Standard Telephone Company should make good its promises to enter the telephone business or retire from the field."

This advice we deeply appreciate, and, in our own way, will follow it, by entering the field, when we get ready. In the meantime, Mr. Editor, do not allow yourself to worry, for life should be made as bright and comfortable as possible.

Now for the next remark, as to what patents we have under which it is thought that dividends can be earned. No doubt you have seen the sneak circulars of the irresponsible "Maxwell," who flooded the country with them, offering "$10 Reward," to any one who would "furnish a complete list of the Standard patents." Suppose we now simply said patents granted originally to W. R. Cole, of Michigan. Don't you think they possess enough value to warrant agreeable anticipations? If you do not, we differ in opinion But in any event, pray spare yourself on this point, for the Cole patents are not the only patents controlled by the Standard, a "complete list" of which was not furnished, even under the inducement of a reward of $10!

Next: You ask "in what direction has your company been at work?" Well, now, here is richness! What guileless simplicity, by the square yard, you do imitate. I am willing to be regarded as a countryman for sending any answer to your former letter, but what shall be said of the astounding innocence of this gentle request? I might reply, in a general way, and with entire truth, that we have been "at work" in the general direction of the establishment of the business, in general. If you read that carefully, you will see that it means hard work, and plenty of it, and that it is fair to ask a reasonable allowance of time in such a large undertaking.

Next: You say announcement that we would establish a telephone exchange in New York this year was a mistake. It would have been so, certainly, if such announcement had ever been made. It was never made by me, as you intimate, and you are fair and just in putting it as you do, that I "was reported as" giving out that expectation. But right here, if I were an editor, and could keep up the multiplication of questions, I would ask you this: Do you not know that within a very short time there must be a successful telephone system in operation in New York city in competition with the Bell, and that the rates for service can and will be reduced, under Standard methods, to, say, not over about $3 or $4 a month? That is a pertinent question, and, if you have patience, a practical reply will be forthcoming. For the first time in telephonic history it is possible to regard this as a reasonable certainty, because of the simplicity of the Standard switchboard. As against that switchboard, neither the Bell nor any other company can hope to enter the lists. (For explanatory facts on this point, see the New York *World* of October 27 last.)

If you are also suffering to know, as you appear to be, who publicly originated the charge that the Bell owns the Standard, I reply, "Maxwell" This will be proved, to you or to any one, if you think it worth while. But what useful object you can have in asking is something I leave you to explain. You put forth this question, like the others, as though it were an affair of vast consequence, and as though the public ought to hold an indignation meeting and "demand" to know what we have to say in reply to what seems to me an extremely unimportant question. Who cares a penny who started that canard? What difference does it make who started it?

Finally, will I name the sub-companies controlled by the Standard? Why should I, simply because you ask that I should do so? I fail to see by what right you, or any other editor, put forth questions of this sort, and failing to get what is regarded by you as a satisfactory reply, straightway seek to assume that you have not been treated with due consideration. Suppose I should answer: The Standard controls the "McDonough" and the "National." That would not necessarily tell the whole story.

The really significant thing is that you, Mr. Editor, should try to assume that simply because you ask a question the Standard company is called upon to answer; and if they do not, you like to imagine that you have a grievance. Why don't you ask a man this: "Have you stopped the practice of beating your mother?" And then, if he declines to answer, offer "$10 reward" to anybody who will prove that he is not a matricide. Do you think that newspaper abuse is going to kill competition in the world of telephony?

I understand that when the Bell is attacked, it is the policy of that corporation to make no reply whatever. I believe such is also the astute and unbroken practice of the Standard Oil Company. I have seen no response from the directors of the General Electric Company, when they, although they are all men of high position, are assailed in the technical press. I don't know exactly how the board of directors of the General Electric is made up to-day, but a short time ago, among others on it were, I think, H. McK. Twombley, D. O. Mills, H. L. Higginson, Thomas Jefferson Coolidge, T. A. Edison, J. Pierpont Morgan and R. T. Paine, 2d. Are these men "swindlers?" To say such a thing is monstrous; and yet that is the sort of stuff emanating from a technical publication, and reiterated without denial.

The attitude of the great and successful corporations and individuals mentioned is one of absolute silence. They furnish an admirable example, which, henceforth, we shall follow unalterably, and let results speak for themselves.

THURLOW WEED BARNES,
President.

November 23, 1895.

"He argued high, he argued low,
He also argued round about him."
—*Bab Ballads.*

Mr. Barnes's latest screed, which bears the earmarks of many revisions, is totally irrelevant and disingenuous. It lacks entirely the atmosphere of honesty and sincerity. Its style, trend of thought and logic (?) render it almost unanswerable except in a similar vein, which would be wearisome and profitless to the readers of the ELECTRICAL REVIEW. From this mass of matter, however, several points may be untangled which admit of brief comment.

Mr. Barnes mentions the "apparent friendliness" of our letter of November 14 to Mr. Nye, which Mr. Barnes saw fit to answer. In this case the wish was certainly father to the thought for we think any sensible person will admit that our letter was brief, frank and business-like. We stated that we expected to have something to say about the Standard Telephone Company and this interested Mr. Barnes sufficiently to call forth his reply and an order for 250 copies of the ELECTRICAL REVIEW in which it appeared. He hasn't called for the papers yet. Doesn't he want them now? May be his letter doesn't look as well in cold type as he thought it would.

As for the mysterious and high-salaried "Maxwell" referred to above, we do not know who he is and have never seen any of his alleged circulars or communications. We feel sure that the American Bell Telephone Company has no use for "Maxwell" and regards the whole Standard outfit with supreme contempt.

We are glad to learn that Mr. Barnes appreciates our timely advice about the Standard company redeeming its promises to enter the telephone business or retiring from the field. This is but one of the many ways in which we endeavor to make life "as bright and comfortable as possible," to quote Mr. Barnes again. The advice was given freely and gladly from our large supply, which is not nearly exhausted, and will not be as long as the Standard Telephone Company is in need of it.

We think "Maxwell" was a first-class idiot to offer $10 reward for a list of the Standard company's patents. Even if they actually owned so much as a controlling interest in hundreds of telephone patents as solid as the rock of Gibraltar, it doesn't follow that a practical working telephone system could be constructed under them. It needs more than patents to produce a telephone system that will talk.

President Barnes must be losing his memory as well as his head when he writes:

"You say announcement that we would establish a telephone exchange in New York this year was a mistake. It would have been so, certainly, if such announcement had ever been made. It was never made by me, as you intimate, etc."

We quote from the ELECTRICAL REVIEW for April 10, 1895:

* * * Last Friday Mr. Barnes gave out an official interview in which he said:

"We have over 200 prominent capitalists in the United States interested in the company. We propose to commence our service this Summer in New York city with a rate of $3 a month for telephones. We have purposely kept the matter very quiet for nearly three years until we had secured the franchises we wanted." * * *

The official interview of which this quotation formed a part was handed by Mr. Barnes personally to a representative of the ELECTRICAL REVIEW who called upon him in his Wall street office last April. The same matter was also supplied to other newspapers and news bureaus. We believe that further comment on this point is unnecessary.

Mr. Barnes's prophecy as to the establishment of a new telephone service in New York city "within a very short time," with rentals of "about $3 or $4 a month," must be another April-fool joke similar to the one referred to in the preceding paragraph. There may be an "opposition" telephone service in New York city some day, but it won't be established in a very short time nor on any such ridiculous basis of rentals, and our guess is that its name will not be "Standard."

Newspaper abuse, or abuse of any kind, can not kill honest competition. The Standard Telephone Company challenges nothing except the honest views of conscientious critics. The methods attributed to the Standard company are the most harmful blight that has yet attacked honest competition in the telephone business.

The pointed questions asked of President Barnes in last week's ELECTRICAL REVIEW are entirely evaded. We regret that he neglects to tell us the name of the author of the circular suggesting the greasing of city councils, which we have reason to believe was prepared in his own office and sent out over the signature of General Manager Allen T. Nye. Likewise our inquiry as to what business has been done by the Standard Telephone Company, or what business *can* it do, to justify its capitalization or the capitalization of its sub-companies, brought forth no direct answer.

There are other questions that we had intended giving President Barnes an opportunity to answer, but as his policy of evasion is so apparent we shall have to answer them ourselves and in our own way.

More anon.

Samples of Silicon Bronze Wire Wanted.

An esteemed correspondent of the ELECTRICAL REVIEW writes as follows:

Can you tell me where in this country it would be possible to obtain small samples of the silicon bronze wire manufactured by the Lazarre-Weiler people?

We shall be obliged to any of our readers who can supply this information.

Street Railways in the United States.

Poor's Directory of Railway Officials states that the total length of street railway lines in the United States equals 13,176 miles, an increase of 3,514 over 1891. The capitalization of 12,797 miles of street railroads from which reports have been received aggregates $520,745,823 stock and $367,694,477 bonds.

New York city will soon be supplied with an effective system of underground electric railways reaching and covering the principal thoroughfares. Meanwhile the elevated railway management slumbers peacefully amid the noise, cinders, steam and kerosene odors of its own making.

OUR CANADIAN LETTER.

A winding-up order has been issued by the Superior Court against St. Jean Baptiste Light Company, of Montreal.

Eganville is soon to have the electric light. McRea & McKensie, millers, have ordered a plant and will operate it by water power.

W. Ross is again endeavoring to obtain an electric lighting franchise for Rat Portage, Ont. The council is considering the application.

The Electric Light Company, Niagaratown, has bought land to build an 80 by 100 brick power-house to cost $10,000, and the machinery about $25,000.

CHATHAM, ONT.—The electric railway projectors have made a survey of the town and pronounce the prospects good. They will invest $150,000 in the enterprise, and will build a loop line in the city and give a six-minute service.

FORT WILLIAM, ONT.—The company that recently acquired the Kakabeka water power is negotiating with this town for the putting in of an electric light plant, and it is probable the offer of the company will be accepted.

CAMPBELLFORD, ONT.—Northumberland Paper and Electric Company, incorporated, capital stock, $100,000, to acquire the plant of the Northumberland Paper Company and Egg Case Company, and to manufacture pulp, paper, etc.

The Fraserville Electric Power Company, Fraserville, Que., is applying for incorporation, with a capital stock of $25,000, to operate telephones and do electric lighting and supply electric motors for commercial purposes in Kamouraska and other counties in the Province of Quebec.

CHAMBLY, QUE.—The Richelieu River Hydraulic and Manufacturing Company, which is applying for incorporation, proposes to construct dams, bridges, waterworks and establishments for the manufacture of electrical machinery and apparatus. Sicotte & Bernard, of Montreal, are the solicitors for the company.

HULL, QUE.—Theophile Viau, of this town, who is the owner of the franchise for an electric railway between Hull and Aylmer, is negotiating with several New York capitalists to purchase the franchise and build the road, and it is probable the sale will take place, in which case construction will be commenced early in the Spring. J. A. C.

Montreal, November 15.

Clumsily Worded English Advertisements.

Curiously worded advertisements, which are funny without intent, are more common in the London papers, it would seem, than they are in New York publications, says the *World*. An English periodical offered a prize the other day for the best collection of such announcements and the following is the result:

"Annual sale now on. Don't go elsewhere to be cheated — come in here." "A lady wants to sell her piano, as she is going abroad in a strong iron frame." "Wanted, experienced nurse for bottled baby." "Furnished apartments suitable for gentlemen with folding doors." "Wanted, a room by two gentlemen about 30 feet long and 20 feet broad." "Lost, a collie dog by a man on Saturday answering to Jim with a brass collar round his neck and a muzzle." "Wanted, by a respectable girl, her passage to New York, willing to take care of children and a good sailor." "Respectable widow wants washing for Tuesday." "For sale—a pianoforte, the property of a musician with carved legs." "Mr. Brown, furrier, begs to announce that he will make up gowns, capes, etc., for ladies out of their own skin." "A boy wanted who can open oysters with a reference." "Bulldog for sale; will eat anything; very fond of children." "Wanted, an organist, and a boy to blow the same." "Wanted, a boy to be partly outside—and partly behind the counter." "Wanted for the Summer, a cottage for a small family with good drainage." "Lost, near Highgate archway, an umbrella belonging to a gentlemen with a bent rib and a bone handle." "Widow in comfortable circumstances wishes to marry two sons." "Wanted, good boys for punching." "To be disposed of, a mail phaeton, the property of a gentleman with a movable headpiece as good as new."

The last is a copy of an inscription painted on a board which adorned a fence in Kent. "Notis: If any man's or woman's cows get into these here otes, his or her tail will be cut off as the case may be."

Press Club Dinner to Sir Henry Irving.

The New York Press Club gave a midnight dinner to Sir Henry Irving Monday night, November 11, and the facilities of the handsome new club house on Twenty-sixth street were fully tested by the large attendance. President Joseph Howard, Jr., occupied the chair in particularly able style, and his address, as well as the remarks of Sir Henry, Gen. Horace Porter, John W. Keller, Murat Halstead and Gen. Felix Agnus, were felicitous to a high degree. It was after 4 A. M. when the "midnight dinner" came to an end, and it was pronounced by every one privileged to be present one of the most successful gatherings of this always lively and enthusiastic club.

Injunction Against Boston Socket Manufacturers.

In the United States Circuit Court at Portland, Me., on November 14, Judge Webb heard the case of a bill in equity brought by the Edison Electric Light Company and the Edison General Electric Company against the Anchor Electric Company, to restrain it from making and vending an incandescent lamp socket. A similar bill was also brought against the Boston Switch Manufacturing Company. The defendants agreed to the issuing of a temporary injunction as asked for by the plaintiffs, except that the defendants stipulated that the injunction should apply only on the second claim of the patent involved. Judge Webb issued the injunction.

"Lodian," Traveling Technical Correspondent.

"Lodian," a nomadic correspondent who has several times sent descriptive articles from foreign parts to the ELECTRICAL REVIEW, has been recently "footing it" through the far East. He has favored us with his photograph, which is reproduced herewith. Lodian has a spelling system of his own, which is exemplified below — "usual simple abbreviations used." With the photograph Lodian sent this letter:

"Editor,—Dear Sir: Hav had this foto taken as a compliment to yor journal. If u reproduce it, it wil be noted with plesure by advertisers—as a proof of the widespred circulation of yor journal—and consequently an item of valu to them.

"If u can't use foto, stick on yor wall, as a 'warning exampl' to others.

"My next definit move is to Siberia.

"From Lodian.

"Hong Kong, China."

Lodian then proceeds to describe

"LODIAN," TRAVELING TECHNICAL CORRESPONDENT IN CHINESE GARB.

matters as he sees them. Here are his own words:

THE "ELECTRICAL REVIEW" IN THE FAR EAST.

"This is a vista of the visage of one of this journal's ocasional scribes in the extreme orient. Lodian writes, he found he coud get on betr among the orientals by adopting their costume—geting hed shavd, wearing a cue, doning the white-soled footgear of the celestials, etc.; but —— the cherishd goatee of the yank of typicy was too dear to American nature to be discarded. The sno-white, loose & scant clothing of the orientals provd far mor preferabl in their piping-hot climat, than western bodygear.

"Lodian is a literal nativ of the steady-habits state (or, as Webster has it, land of steady habits), but has resided litl ther. He rec'd his education principaly in Latin-America, España, & France, & has pasd the greater part of his life travling in forin climes,—interspersed with trienial visits to & tours thru the United-states.

"He is just now concluding his sojourn in the far far east, & is shifting northward via upr China to the port of Vladivostok (Siberia), wher he winters befor travling overland in the erly spring to Paris,—an entirely terrestrial, circuitous journey of about 8000 miles.—The portrait is by F. Kap, Calcutta & Hongkong.

"It is a proof of the widespred circulation of this journal—and consequently an item of valu which wil be apreciated by advertisers—the fact of our having a travling correspondent in the far far east, to look up our peopl & interests ther—, whose interesting letr—replete with valuable data—wil be found on another page, & whose 'face' apears here,—our journal in hand."

American Institute of Electrical Engineers.

At the regular monthly meeting of council, held at the rooms of the Institute, 26 Cortlandt street, November 20, 15 associate members were elected, and 10 associates were made members.

At the meeting of the Institute at 12 West Thirty-first street the evening was devoted to a consideration of the topic "Storage Battery Applications." Communications submitted by A. E. Childs and C. L. Edgar, of Boston; F. B. Crocker and N. W. Perry, of New York, and Carl Hering, of Philadelphia, formed the basis of the discussion which was participated in by H. Ward Leonard, E. T. Birdsall, J. B. Entz, J. Appleton, C. Blizard, Townsend Wolcott, J. W. Lieb, Jr., and others. This was the first experience of the Institute in the line of topical discussions, and the result in New York was very gratifying.

The attendance of members and guests was 115, and President Duncan deemed it advisable to call for an adjournment at 11 o'clock. The subject was also discussed at Chicago and San Francisco the same evening.

Some Good Advice.

The successful merchant is he who is governed by business principles. He insists on others meeting their bills promptly, as he does his. He will not undertake an order that there is not some profit in. You might as well get right down to rock bottom first as last. Keep your expenses down to the lowest economical point and get right down to the lowest notch in buying and manufacturing; then, if you are underbid, find out how it is done. If your competitor can not buy closer or work cheaper than you, then he is losing money and can not last long. Do not take work at a loss, with the intention of making it up on future business, because the customer who buys from the lowest bidder is sharp enough not to let you get even. The way to success is a difficult road to tread at the commencement, but pursue the path honestly and with the best intentions, when all that is desired will be attained.—*Paper and Ink.*

MUNICIPAL TELEPHONY.

ABSTRACT OF A PAPER READ BEFORE THE NORTHERN (BRITISH) SOCIETY OF ELECTRICAL ENGINEERS, NOVEMBER 11, 1895, BY A. R. BENNETT.

In this country we have had no actual experience of municipal control of telephone systems, although Glasgow and several of the other Scottish towns are desirous of making a move in that direction; but abroad things have been different, especially in Norway, where, in one town of importance, the telephone system has been owned and managed for the last six years exclusively by the Town Council; while in Christiana the municipality has contributed largely to the capital of the local telephone company, and, being represented on its board by three town councilors, exerts a powerful influence on its management. These experiments have been so decisively successful that municipalities in other countries are taking steps to imitate them. Thus we find that the Town Council of Rotterdam is actually engaged in the construction of a telephone system designed to compete with that of the existing company, whose service has not been considered satisfactory, while the Town Council of Amsterdam has a similar project under consideration.

These facts have an important bearing on the present position of telephony in the United Kingdom. Our telephones are now controlled by two bodies only—the Post Office, and the National Telephone Company. The exchanges possessed by the Post Office with the one exception of Newcastle-on-Tyne, where there are some 600 subscribers, are quite insignificant, the Post Office subscribers in the United Kingdom not exceeding some 1,200 or 1,300 in number. The Post Office exchanges, moreover, show no tendency to develop, many of them quite the contrary. Even Newcastle-on-Tyne has remained practically stationary for years, for the Post Office exchange in that town numbered 600 subscribers seven or eight years ago. The result is that the National Telephone Company is virtually invested with a monopoly, which, according to assertions constantly made in all parts of the United Kingdom, the company employs in a manner more calculated to benefit its own shareholders than to satisfy the reasonable requirements of the public.

Independent companies have endeavored from time to time to compete with the National Telephone Company but always unsuccessfully, because this powerful corporation has invariably bought up its opponent regardless of cost; tactics which have been rendered successful solely by the support which it receives from the Post Office.

No person or company may construct telephone exchanges in this country without a license from the Post Office, and such licenses have for several years past been withheld. The telephone patents under which the National Telephone Company for many years preserved its monopoly expired in 1891. But no sooner had the patents expired and the grasp acquired by the company on the country by their means loosened than the Post Office re-invested the company in its monopoly by refusing to grant any more licenses. The consequence is that telephonic charges in the United Kingdom are greatly in excess of those which prevail in most other countries.

Unquestionably, to whatever cause the fact may be ascribed, the development of telephony in the United Kingdom has lagged behind that attained in many other countries. In a paper which I contributed to the British association at its recent Ipswich meeting I gave statistics which showed that the United Kingdom, the greatest home of industry in the world, ranked only tenth in the point of telephonic development amongst the European nations, and I sought to account for this unpleasant fact by comparing the conditions which exist here with those which have enabled nine other European countries to outstrip us.

This state of things is a serious one for the British man of commerce. In Germany, Belgium, Norway, Sweden Denmark and other countries we find a large proportion of the towns connected by trunk lines, so that the subscribers may call up their correspondents in all parts of the country. In many cases the trunk lines have now passed the boundaries of the different countries, and the merchants of several of the capitals and of the chief ports and centers of industry in the various States may communicate telephonically. I am, of course, aware that trunk lines exist in this country, and that communication has been established between London and Paris; but there is this important difference: On the Continent the charges made for the use of the trunk lines are extremely reasonable. Thus, in Germany, one can telephone all over the country for the sum of 1*s.* per three minutes, and even lower rates prevail in other countries. In the United Kingdom the charges are so heavy (and after the first of January next, when the Post Office will assume control of the trunk lines now worked by the National Telephone Company, they will be still further, in many cases, increased) that trunk-line communication remains a luxury. No doubt the Post Office could point to a considerable telephonic traffic between London and Paris, and perhaps between London and Manchester, Liverpool and Glasgow, but an analysis of this traffic would probably show that these lines are not used, as a rule, by the commercial or manufacturing communities, but by stock brokers for the purpose of buying and selling stocks. Communication between London and Paris is almost exclusively to this end, and I believe the same applies to the use which is made of the new trunk line between London and Glasgow.

The fact is explained by the high rates charged, which stock brokers can afford to pay and others can not. Thus the curious circumstance is brought out that the public money voted by Parliament to the Post Office for the development of telephonic communication is being devoted mainly to the benefit of one class, and that a class not generally esteemed the most reputable of the community.

Having briefly summarized the present position of telephones in the United Kingdom, I will ask the members of this society to accompany me in spirit to Norway and there ascertain what has been done by municipalities with the object of bringing home the telephone to every business man, and of allowing those who desire it the luxury of telephonic communication in their private houses. It may be remembered that the late Postmaster-General stated in the House of Commons that telephones in this country must always remain a facility to be enjoyed by the rich and that even if by low rates a very large circle of subscribers could be obtained, the technical and engineering obstacles in the way of connecting them to an effective exchange were insuperable.

Of course no practical telephone man believes that, even in this country; and abroad the statement of Mr. Arnold Morley has created much amusement, for foreigners have in their own cities, and even in their own villages, proofs before their eyes that the statement is inaccurate.

I recently made a minute inspection of the telephone system of Trondhjem, which is the third town of Norway, and possesses about 30,000 inhabitants.

The original telephone exchange was commenced in 1882 by a Mr. L. Spörck, who had obtained a concession from the Town Council. Mr. Spörck secured a considerable number of subscribers, which was not surprising, seeing that his charges amounted only to £2 10*s.* per annum for a place of business and £1 5*s.* per annum for a private house, rates which applied to distances not to exceed about an English mile. But the service given was not entirely satisfactory, and in 1889 the Town Council determined to purchase Mr. Spörck's system and thereafter manage the telephone business itself. Mr. Spörck having been paid the sum of £1,833 for all his rights, the Town Council proceeded to re-construct his system in the most substantial and modern manner, a proceeding which, no doubt, provided a good telephone exchange, but which burdened the town with nearly £2,000 of superfluous capital at the start, inasmuch as the value of Spörck's material when taken down was so small that the purchase money paid was not represented by any valuable asset.

The capital expenditure, including the aforesaid purchase money, now stands at £7,979, with which sum 780 exchange and eight private lines have been constructed. The total number of lines being thus 788, it follows that each line has cost the town on an average £10 2*s.* 6*d.* The population of the town being 30,000, there is one exchange telephone to each 38 inhabitants. In the United Kingdom the proportion is one in 636.

The rates fixed by the Town Council were rather higher than those of Mr. Spörck, but are not, nevertheless such as could be considered at all excessive in this country.

They are as follows:

	Per annum. £	s.	d.
For a telephone exchange line connecting a place of business not exceeding one and a half kilometers (about one mile) from the central station.....	3	6	7½
For a second business connection for the same person or firm.....	2	13	3
For a private house, not exceeding one and a half kilometers from the central station.....	1	13	4

Should lines exceed in length one and a half kilometers, these charges are increased by 5*s.* 6*d.* per annum for each 100 meters in excess.

These charges include all payments. The Town Council supplies all the lines and instruments and maintains them. It is necessary to take particular note of this fact, because in some places, in Norway and other countries, subscribers buy their own instruments and pay the cost of their lines, circumstances which have sometimes been put forward as applying universally to all cheap continental rates; but they are the exception not the rule. At the middle of last October the value of the subscriptions on the books amounted to 38,300 kronor; and the number of exchange telephones being 780 the average revenue per telephone was 49.1 kroner, or £2 14*s.* 4*d.* per annum.

The Town Council of Trondhjem consists of a burgomaster, 12 aldermen, and 36 councilors. The telephone business is managed by a telephone committee composed of two of the aldermen, one member of the committee being always a practical engineer.

The committeemen retain their position for four years and are thus able to obtain a thorough grasp of the business. Acting under the committee is a manager and engineer who has qualified in the latter capacity in the Trondhjem Technical School, and acquired considerable telephonic experience in other Norwegian towns.

The capital is provided out of the rates, but interest at the rate of four and one-half per cent per annum is charged against the telephone system, so that the ratepayers not only loose nothing by the concern but even make a good profit.

It should here be mentioned that the tariff given above is subject to alteration by the Town Council if such a course should appear desirable, so that the income may be adjusted to the expenditure, and any increase of cost in working thrown upon the telephone subscribers and not upon the ratepayers.

It is, however, satisfactory to note that the tariff has sufficed hitherto not only to cover the working expenses, to provide interest on the capital, to create a reserve fund of five per cent per annum on the capital expended, to insure all the employés against death, accident and sickness, but to leave a small surplus every year. The fact is unquestionable and I am now going to prove it.

(To be continued.)

ELECTRIC RAILWAY NOTES.

The Canton-Towanda, N. Y., electric road will not be completed before next April or May.

The number of persons who rode from Stoughton, Mass., to Brockton on the street railway during the first month of its operation was 40,764.

The Buffalo & Niagara Falls Electric Railroad Company will shortly place an order for 30 new motor cars for its line, which, when completed, will give this road 50 cars.

The new electric road between Binghamton and Union, N. Y., is completed and in running order as far as Hooper, three miles from Union. It is expected that the cars will be running to the latter place by Thanksgiving day.

The new electric line running between Reading and Lowell, Mass., is expected to be completed by December 1. There are large gangs of men at work, and when the line is completed cars will run through from Lowell to Lynn by way of Reading.

The Prohibition Park Electric Railroad, which runs between the park and Port Richmond, Staten Island, has been leased by the Midland company. The road passed into the hands of a receiver, from whom it was leased. It never paid its expenses.

By an arrangement with the Capital Traction Company, the Georgetown, D. C., & Tennallytown Railway Company has been enabled to adopt a new scale of fares between the terminus of its road and any point on the cable lines in this city, and *vice versa*, by which six and one-quarter cents is charged. Four tickets are sold for 25 cents.

The directors of the Norfolk Central Street Railway Company have organized with Francis Doane, of Norwood, president, and Thomas T. Robinson, of Dedham, Mass., treasurer and clerk. A committee has been appointed to select the best route. When this is decided upon, application will be made to the selectmen of Dedham, Norwood and Walpole for a franchise.

Applications for railway legislation next session at Ottawa, Ont., are commencing to pour in. A striking application is that to incorporate the Canadian Electric Railway and Power Company to build an electric railway from Montreal to Windsor, via Brockville, Kingston, Belleville, Toronto and London, with power to build a branch line from Toronto or other points on the main line to Suspension Bridge, and with power to build branch lines for a radius not exceeding 25 miles from any point to points on the main line.

PERSONAL.

Mr. J. H. Reid, of the Westinghouse Glass Factory, Chicago, visited New York city last week.

N. Kumagya, of Osaka, Japan, has been investigating the subject of electric power and its transmission at Buffalo and Niagara Falls. His visit was in the interest of the Cotton Spinners' Association of Japan.

THE MADISON AVENUE STORAGE BATTERY CARS.

DESCRIPTION OF THE EXPERIMENTAL EQUIPMENT NOW BEING TRIED IN NEW YORK CITY.

Some months ago the New York & Harlem Railroad Company, of this city, decided to place two storage battery cars on its Madison Avenue line, to be operated through the Winter in order to determine whether or not the system had been brought to a stage of advancement which would warrant the equipment of the entire road. Many reports have been received from the other side of the Atlantic to the effect that battery cars were being successfully operated on several different lines of railway in that part of the world, but as the conditions in this country are in many particulars entirely different, it was deemed wise to obtain data here from actual operation.

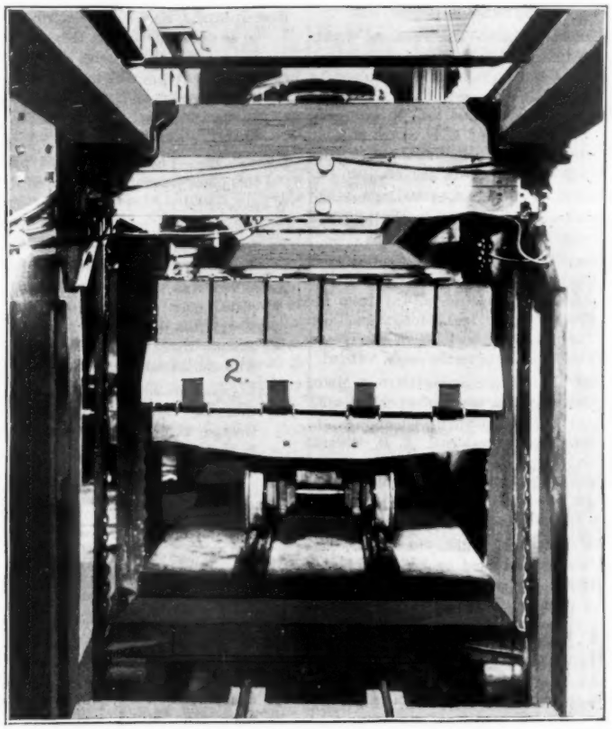
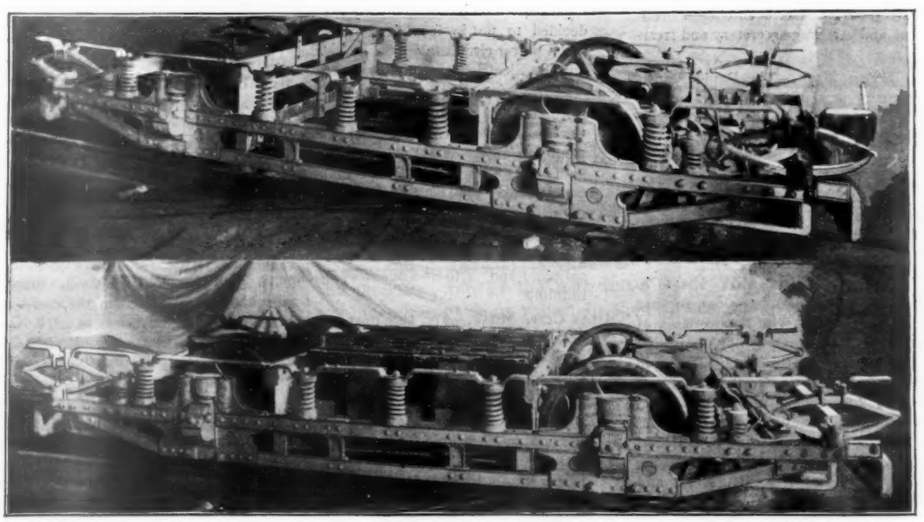


FIG. 1—ELECTRIC ELEVATOR USED IN MADISON AVENUE CAR STABLES TO CHANGE THE STORAGE BATTERIES USED IN CARS.



FIGS. 2 AND 3.—TRUCK OF MADISON AVENUE STORAGE BATTERY CAR WITH AND WITHOUT BATTERY EQUIPMENT.

Serious objection having been made to the great height of step and uncomfortably high or wide seats in the cars heretofore equipped with batteries, a novel method of supporting the batteries on the car was adopted—a method which, though often proposed, had not heretofore been applied.

In the cars now running on the Eighty-fifth street branch of the company's road, the batteries are suspended between the axles, on the car truck, entirely independent of the car body. In fact, so independent are the trucks that they have been run alone, without any car body on them at all. The cars have standard Stephenson bodies, 18 feet long, and standard Peckham trucks.

Sixty cells of nine-plate traction-type Chloride accumulators, capacity 400-ampere hours, are placed in a tray about four and a half feet square and connected up solidly by lead burning, in two series of 30 cells each. This tray is placed on a small transfer truck running on a narrow gauge track in a pit eight feet below the level of the street car tracks in the car barn. An electric elevator is utilized to hoist the tray full of batteries, together with that transfer truck, up between the street car rails into position on the street car truck, where the tray is automatically blocked and the elevator, with the transfer car, withdrawn. Large contact shoes on the car, kept in place by steel springs, engage with contact plates on the trays, as the batteries are raised, so that the connections are made automatically.

Each car is equipped with two "G. E. 800" motors, supported outside of the axles, and two "K" controllers, giving combinations as follows: First, batteries parallel, motors series; second, same, with shunt field; third, batteries series, motors series; fourth, same, with shunt field; fifth, batteries series, motors parallel; sixth, same, with shunt field.

A cable system will be applied to the shifting of the transfer cars in the battery pit.

Another device, not yet in operation, consists of a floating bumper, which, by means of suitable attachments, will automatically center the transfer car with the street car above, so that the battery tray will be in correct alignment before being raised into position on the street-car truck.

The special advantages of this particular method of battery application include the features before mentioned, of low steps for the cars and the standard height and width of seats; an entire independence of car body permitting a change, as for instance, from open to closed bodies and *vice versa;* together with an entire absence in the car of odor from the battery electrolyte; a compact, easily handled tray of batteries; utilization of space below and above the street-car floor, without occupying any of the storage room for cars.

The charging current at the Madison avenue car stables is furnished by a 30-kilowatt Eddy multipolar dynamo, directly belted to a 36-horse-power Otto gas engine, with a 13.5-kilowatt General Electric multipolar generator and 20-horse-power gas engine as a spare plant. This installation is being made under the personal supervision of Mr. G. Herbert Condict, engineer of the Electric Storage Battery Company's railway department.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Electric Railways.

NEW BRITAIN, CONN.—The Central Railway and Electric Company, annual meeting held and old officers re-elected.

NEWTON, MASS.—The Newton Traction Company has been incorporated by H. B. Parker, Newton, Mass.; Louis Pfingst and J. Otis Wardwell, Boston, and others. Capital stock, $1,000,000.

WHITE FISH BAY, WIS.—T. W. Williams and others are interested in the construction of an electric road to Mineral Spring Park.

PORTSMOUTH, VA.—M. W. Mason will construct an electric railway to Prentis Place, a suburb of Portsmouth.

SAN JOSE, CAL.—J. P. Fry, Frank Stock and others are making arrangements to construct an electric road to Saratoga.

OAKLAND, CAL.—Felix Chapplet and others are interested in the construction of a proposed electric road between Haywards and Alvarado.

MONROE, MICH.—The Monroe Street Railway Company is making surveys for its electric road.

SCRANTON, PA.—The Dunmore Street Railway Company has been incorporated with John M. Burke, of Scranton, president. Capital stock, $30,000.

SHREWSBURY, MASS. — The Shrewsbury Street Railway Company, in which S. F. Shaw is interested, has petitioned for franchise for its proposed electric road.

CAPE GIRARDEAU, MO.—The Citizens' Street Railway Company has been incorporated by L. S. Joseph, W. S. Albert, John L. Miller and others. Capital stock, $20,000.

SANBORN, N. Y.—A company, of which Lewis T. Payne, a lawyer, of Pekin, is vice-president, is making arrangements to begin the construction of an electric road 10 miles long from Ely to Erie, Sanborn and Pekin.

FREEHOLD, N. J.—An electric railroad will be constructed from Freehold to Eatontown, if the right of way can be secured.

NEW YORK, N. Y.—The Metropolitan Traction Company has arranged to lease, through the Metropolitan Street Railway, the Forty-second Street and Boulevard Road, and will operate it in connection with the main system.

NEW YORK, N. Y.—The Kingsbridge street railway franchise has been sold to the Third Avenue Railway Company.

CLAYTON, MO.—The Clayton & Forest Park Electric Street Railway is expected to be in operation by December 10.

MILWAUKEE, WIS.—The Milwaukee Street Railway and Electric Lighting Company has made an agreement with the authorities of that city for a five-year contract for street lighting.

NEW ALBANY, IND.—Articles of incorporation have been filed by the Highland Electric Railway Company. The capital stock is $25,000 and the directors are George L. Tuley, Charles Schwartzel, Jacob Zinsmeister and John H. Schwartzel. For several weeks the company has been experimenting with a small dummy engine in an effort to do away with electricity as a motive power.

ELIZABETH, N. J.—The Consolidated Traction Company has purchased valuable wharf property at this place to be used as a terminal of the New Jersey system of the trolley lines in that section of the State, and will connect by means of a ferry across Staten Island Sound with trolley road on Staten Island. The latter system comprises about 25 miles of road along the shore of St. George and to South Beach.

WAKEFIELD, MASS.—The Peabody, Lynnfield & Wakefield Electric Street Railway Company has been organized by B. W. Russell and Thos. H. Johnson, of Salem, Mass.; J. M. Danforth, of Lynnfield, and E. P. Shaw, of Newburyport, to build a line about 10 miles long. Capital stock, $50,000.

AMHERST, MASS.—Dwight W. Palmer and others are interested in the proposed construction of an electric road.

ECORSE, MICH.—The Ecorse Central Electric Railway has been granted a franchise for an electric railway from the River Rouge Bridge to Mongnagon Line. The line must be built in two years. The franchise is for 30 years.

BOONE, IA.—The Benning Current Motor Company has been incorporated with A. B. Stedman, president; A. L. Bradly, vice-president; A. B. Millerd, secretary; E. A. Turner, treasurer, to generate electricity. Capital stock, $50,000.

ALBANY, N. Y.—The Albany, Helderberg & Schoharie Railway Company has been incorporated to build a railroad from this place to Schoharie, a distance of 30 miles, to be operated by electricity, locomotive steam power or compressed air power. Capital, $300,000. Directors, Jonas H. Brooks, B. M. Secor, John W. Van Valkenburgh and Robert J. McCauley, of Albany, and others. The company will have its principal office in Albany.

SHELTON, CONN.—The Shelton Street Railway Company has been organized, and will begin construction of its track through Howe avenue and across the river to connect with the Derby street railway immediately. The capital is $25,000. Directors are Thomas L. Watson and Allen W. Page, of Bridgeport; W. J. Miller and D. S. Brinsmade, of Shelton, and W. S. Downs, of Derby. General Watson has been chosen president and Mr. Page secretary and treasurer.

GRAND RAPIDS, MICH.—The Rapid Transit Company is planning to buy out the Interurban at Saginaw, so that only one line will be built to Bay City.

HESTONVILLE, PA.—The Hestonville, Mantua & Fairmount Passenger Railway Company has made contracts for heating all of its cars by electricity, and the contract requires that every car must be equipped by December 1.

ALBANY, N. Y. — The East River & Atlantic Ocean Railroad Company has been incorporated with the Secretary of State to construct a double-tracked street surface railroad 25 miles in length over various streets and avenues in Brooklyn. The capital is $3,000,000, and the directors are P. H. Flynn, Frederick C. Cocheu, Silas B. Dutcher, George S. Studwell, Joseph B. White, M. J. Kennedy, L. H. Meht and William J. Studwell, of Brooklyn, and James F. Casey, of Albany.

GOSHEN, IND.—The Indiana Electric Railroad Company has executed a mortgage for $500,000 in favor of the Royal Trust Company, of Chicago. The money will be used in the construction of an interurban line between the two cities.

Electric Light and Power.

DEXTER, MO.—An electric light plant is to be constructed.

PRESTON, MINN.—An electric light plant will be constructed.

CORUNNA, MINN.—Thirty thousand dollars' worth of bonds will be issued for an electric light plant and waterworks.

HASTINGS, MICH.—The Hastings Electric Light and Power Company's new machinery has arrived and is being put in position.

BIWABIK, MINN.—An electric plant is to be constructed.

BAZILE MILLS, NEB.—An electric plant is to be constructed, and Geo. A. Brooks has contracted for same.

CLEVELAND, OHIO. — Chas. Pegler, 488 Pearl street, is interested in the organization of a company to light the West Side by electricity.

DELTA, MD.—The electric light plant at this place was totally destroyed by fire.

WATSONTOWN, PA.—The Citizens' Electric Company has been awarded the contract to put in a complete electric plant at the West Branch Table Works.

ABILENE, KAS.—A new electric light plant may be established. A. H. Morris, the Kansas City prospector, is looking over the prospect and meets with considerable encouragement.

WILLIAMS, ARIZ.—Williams Electric Light Company has been incorporated by George E. Nolan, Los Angeles, Cal.; S. C. Wyncoop, Phœnix, Ariz. Capital stock, $10,000.

SPRINGFIELD, MO.—The Springfield Electric Lighting Company has been incorporated with a capital stock of $16,000.

ROSWELL, GA.—The Laurel Mills will put in an electric light plant.

SOUTH SIDE, WIS.—Foundations are being laid for another monster electric generator in the Edison Light and Power Company's power house. It will have a capacity of 2,000 lights, is of the monocyclic style, will be used for lighting the outskirts of the city and its current will be used for arc as well as incandescent lighting. Power for it will be furnished by a 200-horse-power motor. The machine is of the very latest pattern, representing an outlay of $10,000. President F. A. Copeland hopes to have the dynamo in place and running within 60 days.

KALAMAZOO, MICH.—There is likely to be a merry electric light war in this city, the Kalamazoo Electric Company having decided to put in incandescent lights and a power circuit in opposition to the Dunbar Electric Company.

CHICAGO, ILL.—A site has been chosen in Garfield Park for the placing of an electric plant to furnish power for the supply of all the West Side parks and boulevards with light. The estimated cost is nearly $160,000.

DANSVILLE, N. Y.—The new electric light plant is in course of construction at this place. It is to be larger than the old plant and is to be a one-story brick building.

MILES CITY, MONT.—For the purpose of building an electric light and waterworks plant the City Council has authorized an immediate issue of $17,000 of bonds.

GREAT BARRINGTON, MASS.—The Great Barrington Electric Light Company are making preparations to heat their power station by electricity.

PROPHETSTOWN, ILL.—An electric light plant is to be established here.

BEATRICE, NEB.—Beatrice Light and Power Company and the Beatrice Rapid Transit Company have been consolidated under the name of the Beatrice Electrical Company, of which John A. Horbach, Paul W. Horbach, Victor G. Langtry, of Omaha; J. E. Smith, A. S. Maxwell, of Beatrice, are incorporators. Capital stock, $100,000.

WASHINGTON, N. J.—Washington Light, Heat and Power Company has been incorporated by John Karr, Hackettstown, N. J.; Wm. A. Stryker, Frank P. McKinstry, John W. Fitts. Capital stock, $24,000.

SCHENECTADY, N. Y.—The Schenectady Illuminating Company, of which John Kruesi, Charles A. Lieb and George W. Jones are the trustees, has filed a certificate of an extension of capacity to furnish light, heat and power in the towns of Rotterdam, Glenville and Niskayuna. Capital stock, $100,000.

RUTLAND, VT.—The Marble City Electric Company has been awarded the contract for supplying the Howe Scale Works with light. The new system will be put in at once and will comprise 600 incandescent and five arc lights.

LOUISBURG, N. C.—Steps are being taken to establish an electric light plant.

TERRELL, TEX.—The new manager of the electric light plant, so it is stated, proposes to very much improve the work and efficiency of the plant.

DUSHORE, PA.—Electric lights are strongly talked of for this place, and if 200 incandescent lamps are subscribed for, a local company will undertake the enterprise.

Business Troubles.

BALTIMORE, MD.—Application for the appointment of a receiver for the Edmondson Avenue, Catonsville & Ellicott City Railway Company, and also the Baltimore & Catonsville Construction Company, was made in the City Circuit Court.

SARATOGA, N. Y.—The property of the Saratoga Gas and Electric Light Company in Saratoga, N. Y., was sold on November 18 by the referee, James L. Scott, on a judgment obtained in favor of the New York Security and Trust Company. The property was bid in by Lafayette B. Gleason, representing a committee of the bondholders, for $100,000. The judgment amounted to $300,000.

RAHWAY, N. J.—C. W. Boylon has been appointed receiver of the Union & Middlesex Traction Company and Rahway Electric Light and Power Company. The company was incorporated on February 4 of this year with a capital of $200,000.

OMAHA, NEB.—The Northwestern Electric Light and Power Company, controlled by John T. Clarke, brought suit against the new Omaha Thomson-Houston Electric Light Company for $10,000 damages, and against the Omaha Illuminating Company, in which damages amounting to $45,500 are claimed. The plaintiff claims defendant illegally absorbed the complaining company.

DETROIT, MICH.—Stephen C. Smith, a partner with Henry F. DeB. Cameron and Vernor J. Gillett in the electrical construction business at 212 Griswold street, under the firm name of Cameron & Gillett, yesterday filed a bill for an accounting and the appointment of a receiver.

BRIDGEPORT, CONN.—The claim of William H. Proctor, of Cincinnati, of Proctor & Gamble, soap manufacturers, against the insolvent Waddell-Entz Storage Battery Company, of Bridgeport, will go to the Supreme Court on a reservation. Mr. Proctor holds a note of $4,500 against the concern and this is secured by notes amounting to $10,000 additional. Mr. Proctor now asks for a dividend on the whole amount, $14,500. The receiver thinks he is entitled to a dividend on the $4,500 note only.

NEW YORK CITY.—The Sheriff on November 21 received an execution against Thomas Grimwood, of No. 39 Cortlandt street, in favor of the General

Electric Company for $2,762, on a judgment entered against him for $5,420.

CHICAGO, ILL.—The assets and liabilities of the Mutual Electric Light and Power Company are each placed at $25,000.

NEW YORK CITY.—The Columbus & Ninth Avenue Railroad Company on November 21 entered a judgment for $867.86 against the Empire City Subway Company, Limited.

New Manufacturing Companies.

BROOKLYN, N. Y. — Towne Car Fender Company has been incorporated to manufacture and vend safety fenders for use on street and tram cars in Brooklyn; capital, $5,000. Edgar B. Towne, Port Richmond; Franklin S. Towne, Kingston; Samuel R. Chase, Frank R. Eden, Bayonne, N. J.; Stephen W. Mahon, New York, and Edward Swann, New York city, incorporators.

CLEVELAND, O.—Hafemeister Electric and Machine Company has been incorporated by F. C. Hafemeister, G. G. Spaller, Henry F. Stolte, Wm. Hafemeister and W. F. Cowley to manufacture machinery and electrical goods. Capital stock, $5,000.

NEW YORK, N. Y.—International Electric Company has been incorporated by John H. Hawkins, Steubenville, O.; Wm. J. Dixon, Toronto, Ont.; John M. Murphy, Danbury, Conn., to manufacture dynamos, motors, electric railway equipment, etc. Capital stock, $2,000,000 with $10,000 paid in.

ST. PAUL, MINN.—The Standard Brass and Electric Company has been incorporated by Jehiel W. Jaggar, Jacob Heilbron and Theodore Gutting. Capital stock, $50,000.

SPRINGFIELD, N. J.—Premier Electrical Company has been incorporated by Louis A. Jackson, Daniel Jackson and Leon Abbett to manufacture electrical apparatus, etc. Capital stock, $50,000.

MIDDLETOWN, CONN.—The Worcester Cycle Company will engage in the manufacture of electrical supplies and already have a large number of workmen employed.

NEWARK, N. J.—The New Jersey Incandescent Light Company has been incorporated. The capital stock is placed at $100,000, and the business will be commenced with $85,000. The incorporators are Burnett Shatz, William M. Keane and J. Albert McGown.

ST. LOUIS, MO.—The Skeen Electric Switch and Signal Company has been incorporated with a capital stock of $5,000.

BALTIMORE, MD.—The Susquehanna Construction Company has been incorporated by J. W. Kerr, D. J. Fisher, J. H. Miller and others. Capital stock, $100,000. This company is in connection with the plan, heretofore mentioned, of developing electricity from water power on the Susquehanna River at Conowingo.

New Telephone and Telegraph Companies.

ERIE, PA.—The Bell Telephone Company has just obtained right of way through Wheatland, Mercer County.

SISTERSVILLE, W. VA.—At a meeting of the City Council a franchise for the erection of a telephone system in this city was granted to McGhie & Moore, of East Liverpool, Ohio. The system will be connected by long-distance lines with Pittsburgh and Cincinnati.

UNION VALLEY, N. Y.—The telephone line between this place and Pitcher has been completed and is in operation. It will probably be extended to Lincklaen in the Spring.

NEW HAVEN, CONN.—A new telephone exchange will soon be established in this city.

CLYDE, N. Y.—The Wayne Telephone and Telegraph Company has commenced operations on a trunk line from this place to Lyons and will open an office in this village. A line is also under way to Wolcott.

MADISON, WIS.—Oconto Telephone Company has been incorporated. Capital, $7,500. Incorporators, A. H. Luckenbach, C. W. Stoelting and D. G. Classon.

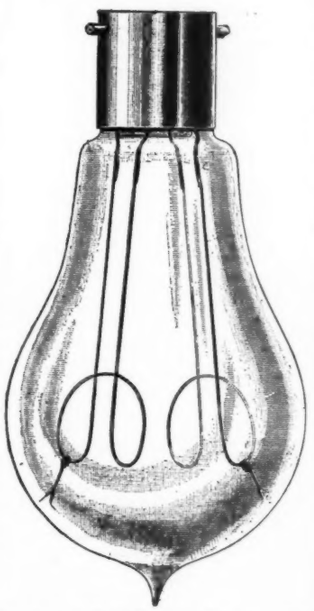
MADISON, WIS.—Pierce County Telephone Company has been incorporated. Capital, $3,000. Incorporators, E. R. Condit, J. M. Johnson, T. E. Nelson and A. E. Michael.

SKOWHEGAN, ME.—The telephone line from this place to Athens through Cornville is completed and doing business. Stations at Cornville and North Cornville.

ELMIRA, N. Y.—The Northern Allegany Telephone Company is about to put up another copper wire on the poles of the main line, thereby making a metallic circuit the entire distance. A new line has just been completed from Hume to Pike. Several private 'phones are being put in at Fillmore and Hume.

The Straus High-Voltage Lamp.

G. Straus & Company, Limited, 130 Queen Victoria street, London,



THE STRAUS HIGH-VOLTAGE INCANDESCENT LAMP.

E. C., and Schwechat, Vienna, are the manufacturers of the high-voltage incandescent lamp shown in the accompanying illustration, which is reproduced from the London *Electrical Engineer*.

The firm claim that with their special carbons even lamps of from eight candle-power to ten candle-power can be supplied with the same efficiency and durability as at the usual voltage of 100, and they quote a letter from Mr. S. W. Baynes, dated Bradford electrical engineer's office, July 4, 1895, in which he says: "I put on test about 12 or 14 of the 230-volt 16 candle-power lamps you originally supplied. They were burnt continuously for over 3,000 hours without a single breakage. The average watts per candle power were about 3.2 and 3.1 during the early stages of the test. On examining the bulb after so long a test you could scarcely tell that the lamps had been in use, there being little or no deposit of carbon on the glass."

The establishment at Schwechat, near Vienna, where these lamps are manufactured, consists of the arc lamp carbon works of Messrs. Schiff, Jordan & Company and the printing and color lithographic works of Messrs. Schiff, Srpek & Company, with common offices, etc. Soot is used in both trades, and the soot furnaces form an important part of the works plant. The joint establishment comprises some 30 buildings, covering an area of about 20,000 square metres, and includes houses for the officials and artisans employed. In the testing building 60 arc lamps, of both Austrian and foreign manufacture and of various systems, are used for testing each brand of carbon. The machinery is for the greater part of English origin. For supplying power there are two boilers and a 360 horse-power compound steam engine. The transmission of power from one works to another and the lighting of the whole establishment are electrical. Electric accident alarms and electric ventilators are also provided. In addition to the employés' houses there are dining-rooms, baths for males and females and an ambulance and first-aid room. The annual capacity of the carbon works is nearly 20,000,000 lineal feet.

WANTED—Position as superintendent of Electric Railway. Thoroughly familiar with electrical equipments, track and trolley construction. Has manager's experience. Address SUPERINTENDENT, care Fremont Wilson, 66 Maiden Lane, New York.

Second-Hand Engines and Boilers For Sale.

Two 9½x10, double, 125 horse-power, Armington & Sims.

One 15x20, 150 horse-power, Ide.

One Boiler, 66 in. diameter and 16 ft. tubes.

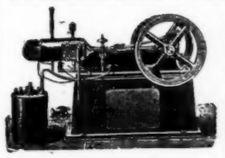
Two 50-light Westinghouse Alternating Arc Machines with lamps. An excellent factory installation.

All in good order and condition. Only for sale on account of being replaced by larger units.

Also a lot of Dynamo Pulleys; prices on receipt of dimensions.

Apply to

N. B. Gas and Edison Light Co.
New Bedford, Mass.



NEW GAS OR PETROLEUM ENGINE

Operated by either INTERCHANGEABLY—with WONDERFUL POWER—ECONOMY of FUEL. Of half the size, weight and COST of CONSTRUCTION of other Gas Engines of same power.

French INVENTION. U. S. PATENT JUST ISSUED. For sale to the highest bidder. MILLIONS may be secured by small investment. MODEL MADE IN PARIS by the INVENTOR; can be seen doing practical service at 22 Union Square, N. Y.

A. L. BOGART.

MESCO DRY BATTERY.

A standard battery for all open circuit or intermittent work. Highly recommended for Telephone Transmitters.

OVER 230,000 SOLD DURING THE PAST YEAR.

For sale by nearly all the Electrical Supply Houses in the United States.

GIVE IT A SEVERE TEST. Unreliable Dry Batteries are not sold much cheaper than the MESCO.

64-PAGE PAMPHLET FREE. Catalogue, 208 pages, 10 cts.

MANHATTAN ELECTRICAL SUPPLY CO.,
32 Cortlandt Street, New York.

FOR SALE.

The plant of the MATHER ELECTRIC CO., located at South Manchester, Conn. This plant has all the modern appliances for doing first-class work, is well equipped and will be sold at a bargain.

Apply to CHAS. M. JARVIS, Receiver, EAST BERLIN, CONN.

WEATHER-PROOF TRADE MARK "O.K." LINE AND HOUSE WIRES

AGENCIES:

ELECTRIC APPLIANCE CO., CHICAGO, ILL.

PETTINGELL-ANDREWS CO., BOSTON, MASS.

ELECTRICAL ENGINEERING CO. MINNEAPOLIS, MINN.

ST. LOUIS ELECT'L SUPPLY CO., ST. LOUIS, MO.

BRADFORD BELTING CO., CINCINNATI, O.

PHILLIPS INSULATED WIRE CO.,

NEW YORK OFFICE: 39 & 41 Cortlandt Street.

FACTORY: PAWTUCKET, R. I.

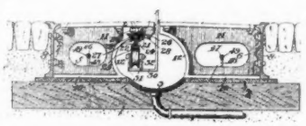
ELECTRICAL PATENTS

ISSUED NOVEMBER 19, 1895.

549,899 Plate for storage batteries and process of making it; F. J. Clamer, Philadelphia, Pa.—Consists of a central core of oxide of lead enveloped in a porous metallic jacket of lead and aluminum.

549,906 Automatic electric fire alarm; H. A. Edgecomb, Mechanic's Fall, Pa.

549,916 Expression indicator for self-playing instruments; F. Hedgeland, Chicago, Ill.

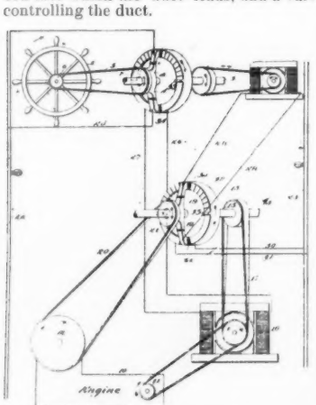


No. 549,920.—UNDERGROUND TROLLEY SYSTEM.

549,920 Underground trolley system; C. E. Hubbs, Streator, Ill.

549,919 Electrical indicator; J. W. Howell, Newark, N. J.—A pointer with two coiled springs located at the opposite pivots of the movable element, one of such coiled springs having no tension at the initial position of the indicator, while the other of such springs has an initial tension.

549,995 Underground conduit; J. F. Cummings, Detroit, Mich. — A conduit having an inner duct, a conductor supported therein free from the sides thereof, a junction box into which the duct leads, and a valve controlling the duct.



No. 550,018.—ELECTRICAL STEERING GEAR.

550,018 Electrical steering gear; F. L. Dyer, Washington, D. C.—A main electric motor, a circuit or circuits therefor, a switch in said circuit or circuits, means for constantly keeping said switch closed, and a second electric motor controlled by the main electric motor, said second electric motor tending to constantly open the switch in the circuit or circuits of the main electric motor.

550,039 Galvanic battery; E. S. Boynton, Brooklyn, N. Y.

550,042 Electric fan; P. Diehl, Elizabeth, N. J.—An armature wheel consisting of a central hub, a series of metallic blades or wings serving as the spokes of said wheel and a ring armature outside of and supported by said blades or wings, with a field magnet located outside of said armature.

550,044 Rheostat for use in electric motor circuits; R. Eickemeyer, Yonkers, N. Y.—A rheostat having two connected sets of contact blocks, with two separate brushes, one in advance of the other, and each in cutting out resistance sweeping over its appropriate portion of said blocks independently of the other.

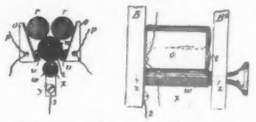
550,057 Closed conduit electric railway.

550,182 Electric appliance for railways; H. A. Petersen, Milwaukee, Wis.

550,096 Fuse box or cut-out; A. C. Carey, Lake Pleasant, Mass. — A binding post having a longitudinal slot and a nut, a block fitted to the slot in such post and held therein by the nut, the said block being divided and bored longitudinally and adapted to receive the bared end of a wire.

550,102 Underground trolley system; C. J. Hamilton, Philadelphia, Pa.—A cover hinged to a suitable support, a lever mounted on the under side of said cover, and suitable weights or counterbalances attached to said cover.

550,167 Electric battery; T. Froggatt, London, Eng.—A pocket cell or battery having an inner diaphragm with passageways for permitting the escape of the gas, an outer diaphragm, and an U-shaped tube having its ends communicating through said outer diaphragm, and its intermediate portion provided with perforations.



No. 550,192.—ELECTRIC PROTECTIVE APPLIANCE.

550,192 Electric protective appliance; A. H. McCulloch, Boston, Mass.—Consists of three carbon plates or surfaces separated and insulated from each other, two of the carbons being connected respectively with the sides of a main circuit, and the other being connected to ground, and means for changing or moving the contiguous surfaces of the said carbons relatively to each other to dislodge accumulated particles from between the same.

550,204 Toll collecting telephone apparatus; G. K. Thompson, Malden, Mass.

550,205 Electric time signaling apparatus; J. T. Todd, Fort Worth, Tex.—An electric time signaling circuit having an adjustable regulating trailer, held in a recessed hour hand by a nut having a milled outer rim and held in a slot in said hour hand, whereby said trailer can be made longer or shorter without being turned in said recessed hour hand.

550,215 Electric arc lamp; E. Canneval, Paris, France.

550,220 Electric car or locomotive; R. Eickemeyer, Yonkers, N. Y.—A slow-speed motor having an armature containing an iron core longitudinally grooved from end to end at intervals on its periphery, and detachable coils, with interposed splines occupying the grooves in the core from end to end, and locking the coils against rotative displacement.

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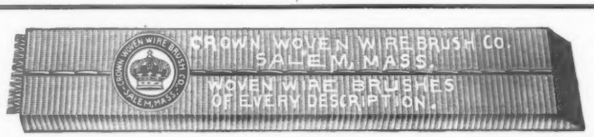

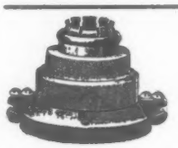

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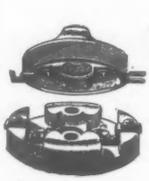
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